# THE JOURNAL OF GAS LIGHTING
## WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXXIII. No. 2106.] LONDON, SEPTEMBER 22, 1903. [55TH YEAR. PRICE 6d.



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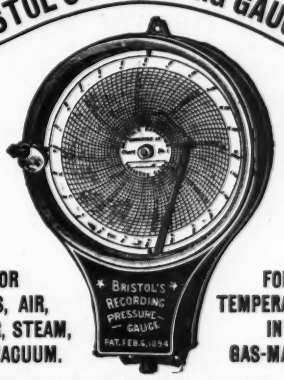


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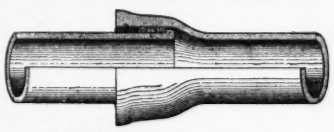

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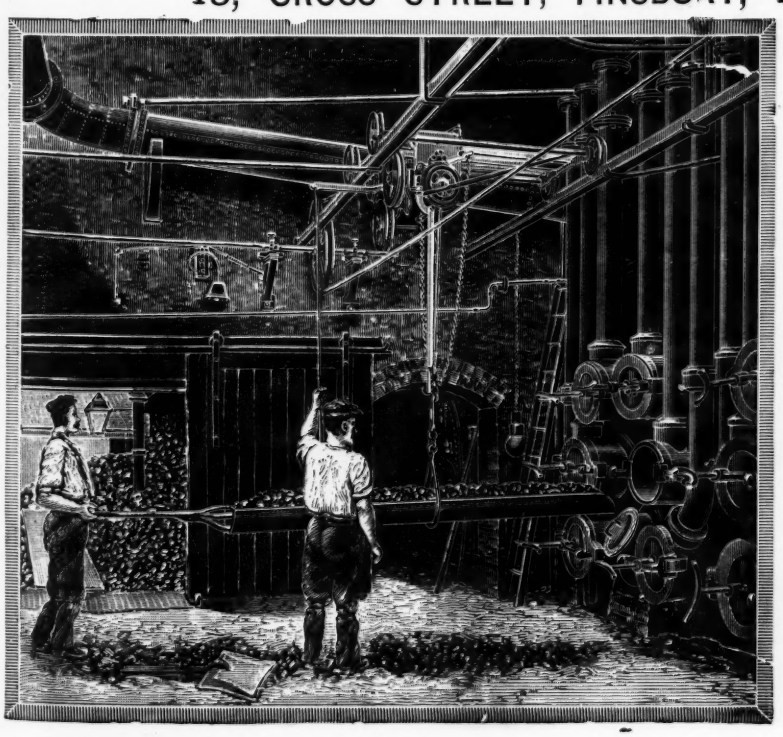

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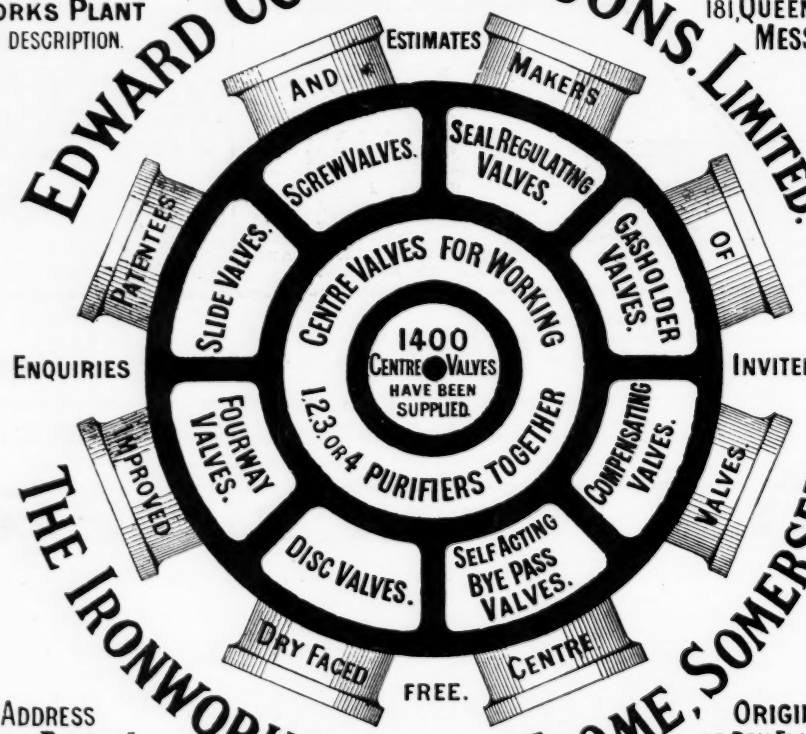


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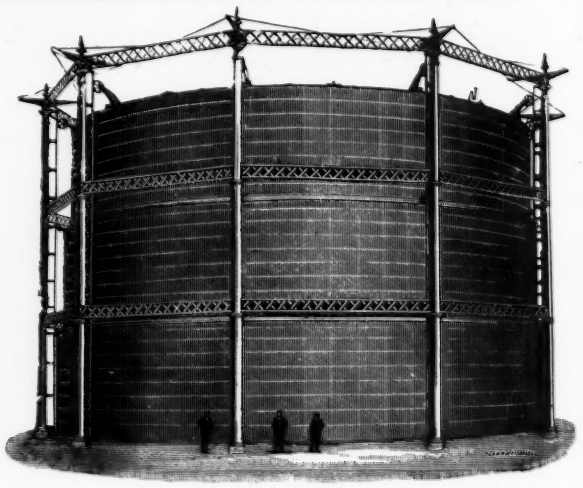

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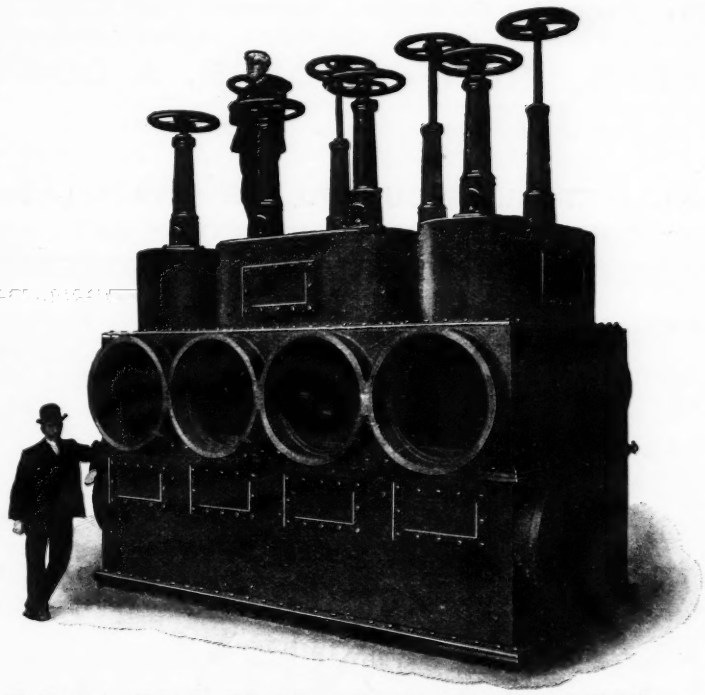

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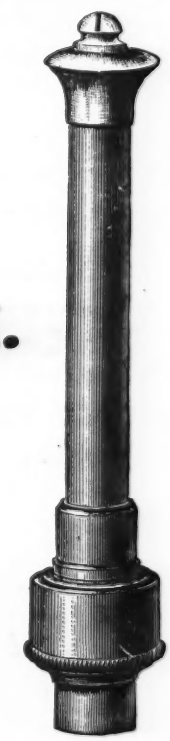

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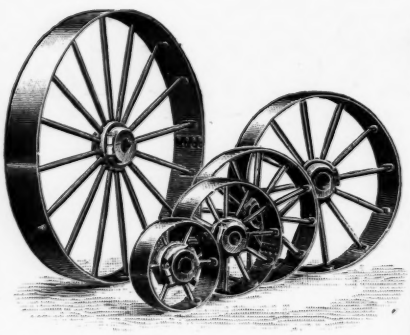

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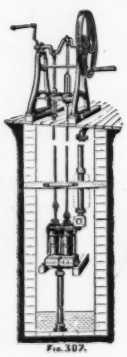


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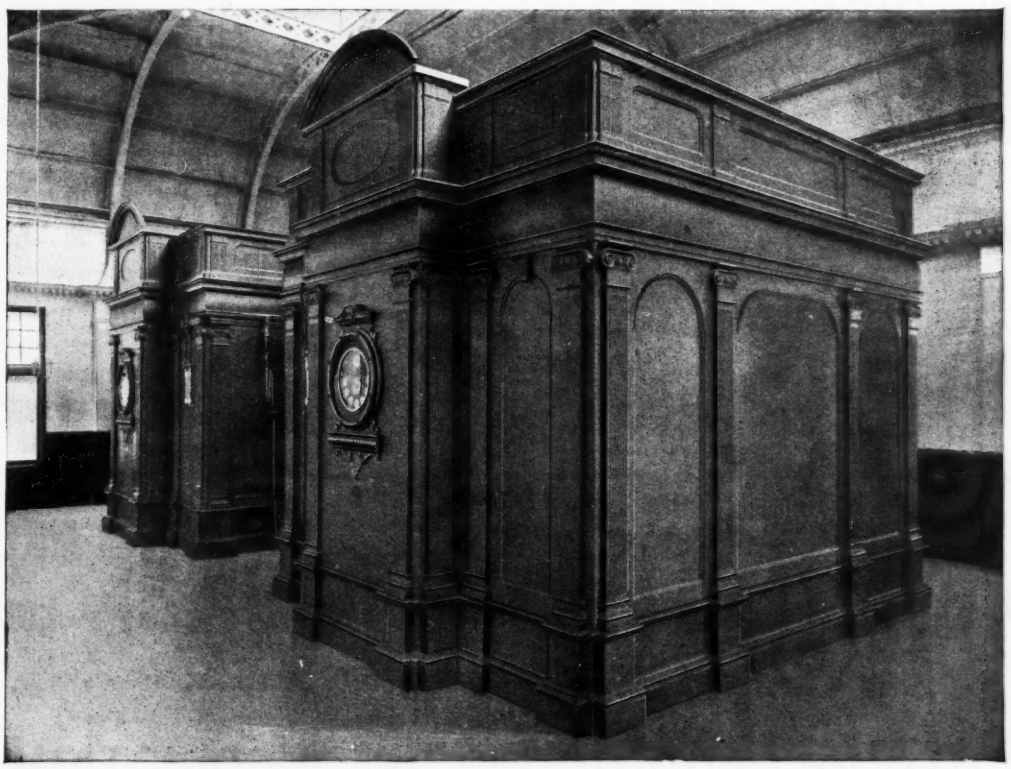

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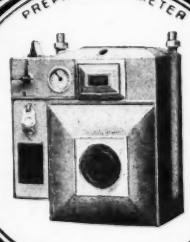


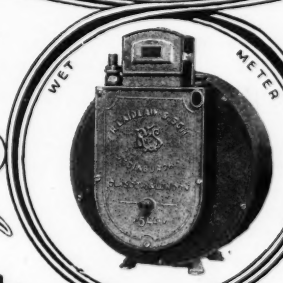


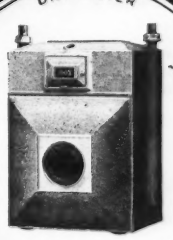


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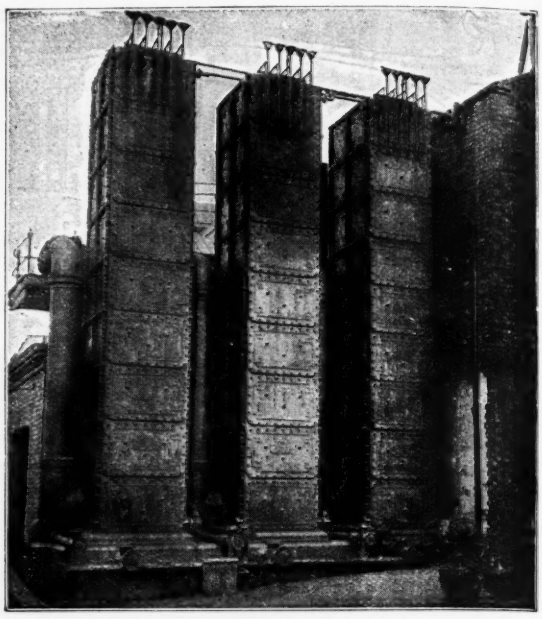

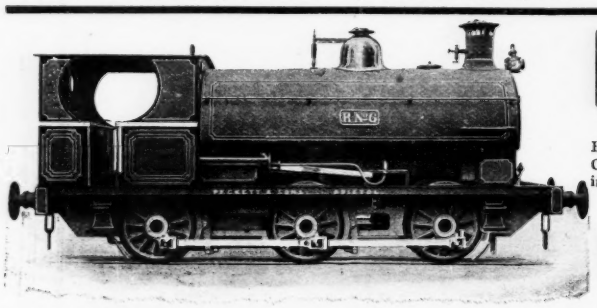

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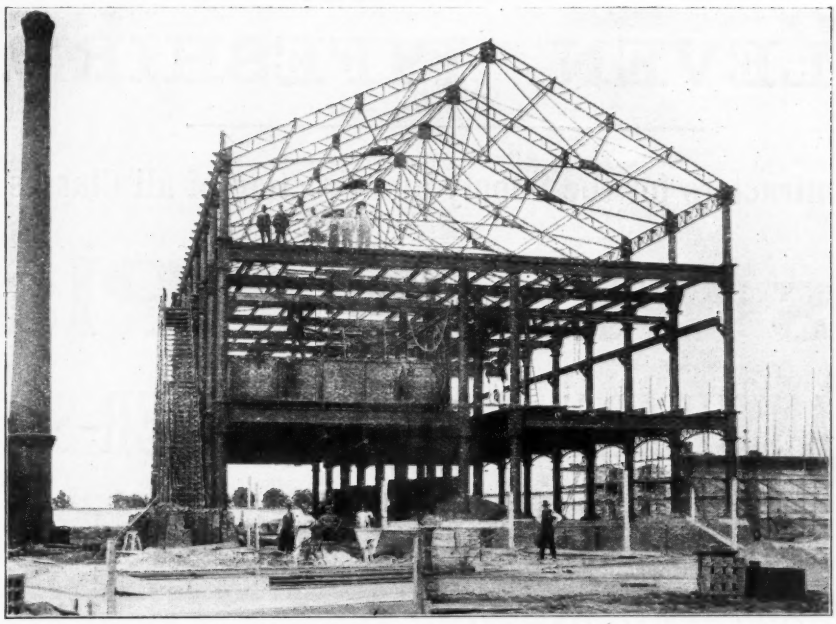

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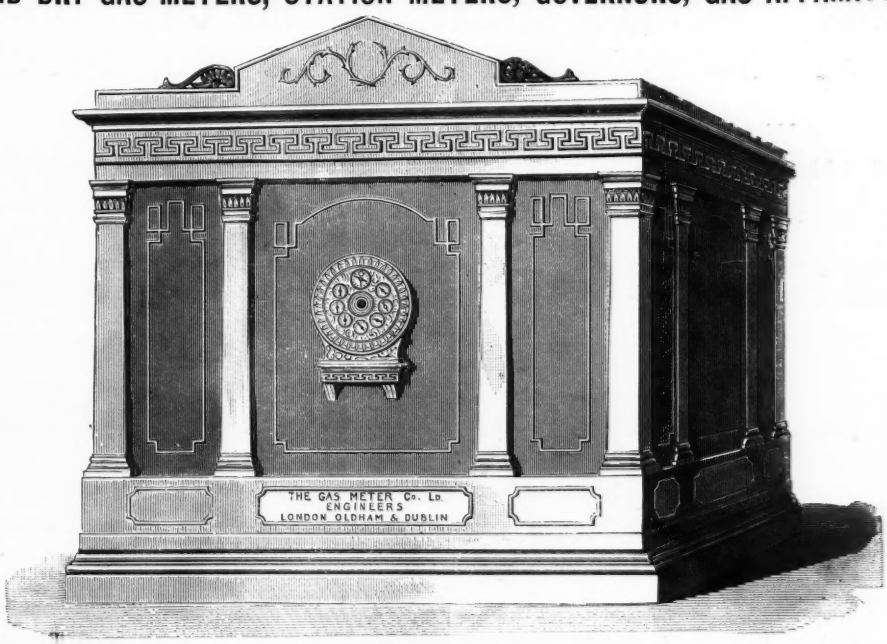


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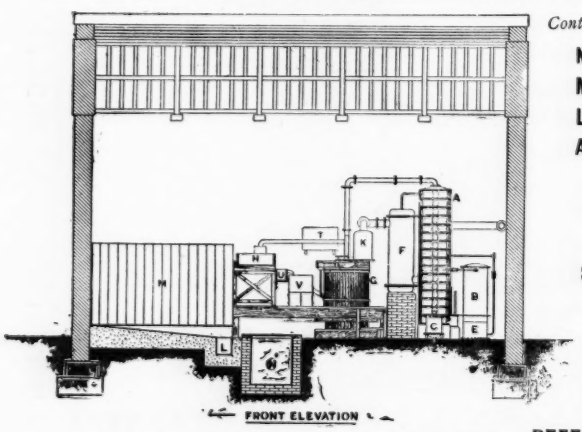


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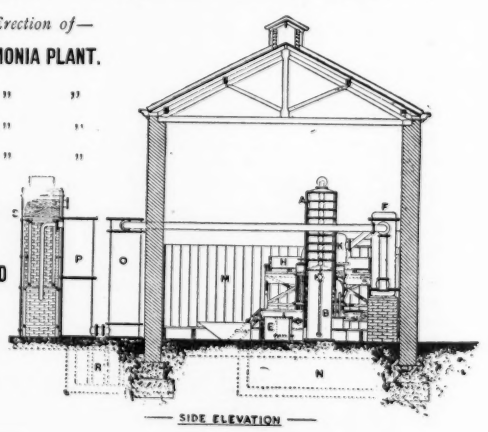


REFERENCES.

*A.* Large Still (Ammonia).
*B.* Small Still (Lime).
*C.* Spent Liquor Valve.
*E.* Limeing Arrangement.
*F.* Heater.
*G.* Saturator.
*H.* Draining Table.
*K.* Lead Catch Box.
*L.* Mother Liquor Well.
*M.* Sulphate Store.
*N.* Acid Store Tank.
*O.* Condenser.
*P.* Scrubber.
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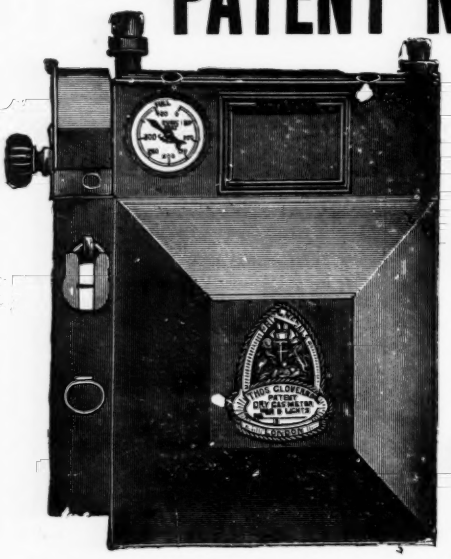

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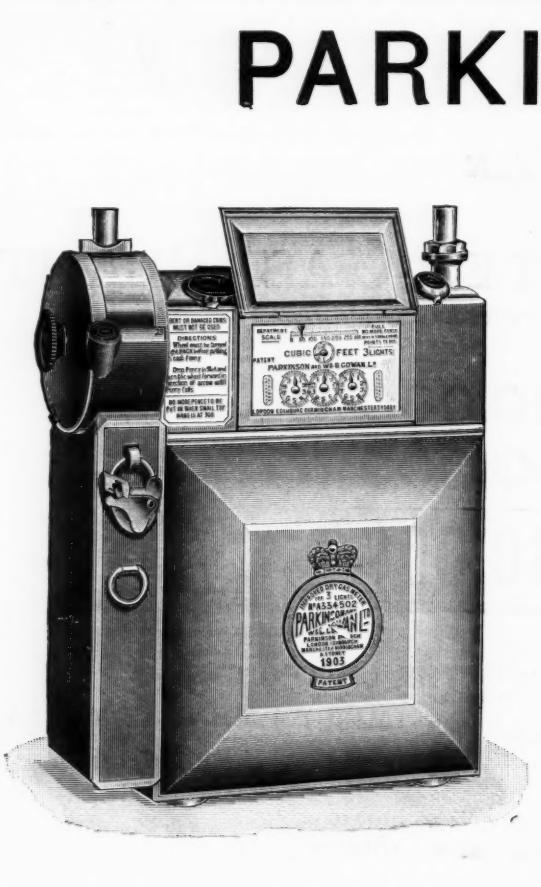

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# JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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## EDITORIAL NOTES.

### The Cabinet Crisis.

THE past week has been a period of "alarms and excur-"sions" upon the political stage, culminating in a split-up of the Cabinet on the fiscal question. The crisis thus precipitated is of a totally unprecedented character. Mr. Chamberlain, the Colonial Minister, has resigned because his views in respect of the future financing of the British Empire go beyond the judgment of the majority of his colleagues, in one direction; and Mr. Ritchie (the Chancellor of the Exchequer), the Secretaries for India and Scotland, and the Financial Secretary to the Treasury (the Hon. Arthur Elliot) have done the same because they think their colleagues have gone too far with the Colonial Secretary. Thus the Cabinet has broken up apparently for two mutually contradictory reasons. The situation is anomalous; but it is clear to everybody that Mr. Chamberlain continues the paramount personality in the English political world. The circumstance of his resignation does not relieve the pressure of the great fiscal question by any measurable amount. On the contrary, it increases it. For henceforth it will be Mr. Chamberlain, acting on his own individual responsibility, who will state the problem and suggest the solution, without being hampered by any obligation to respect the prejudices and susceptibilities of the highly-placed nonentities of whom Cabinets are commonly composed. Thus there is all the more reason why intelligent citizens should prepare themselves, by study and observation, to vote for the conclusion that seems to result most naturally from the evidence.

Although for the moment there is no talk of a general resignation by the Government of Mr. Balfour, with the consequence of an immediate appeal to the country, this step can hardly be put off for very long. A General Election will probably take place as soon as, in the judgment of the influential parties, the issues to be put to the vote are sufficiently clear. This is scarcely the case at present, though the points of the new electoral conflict are coming out more distinctly every day. We have endeavoured, for example, to treat the fiscal problem from the point of view of the gas industry, and have succeeded in establishing something which has not been gainsaid, as to the incidence of business expenses. At the present hour, a similar test is being applied to the suggestion of retaliatory duties, by the representatives of the portland cement industry of the Medway. Portland cement and gas coke are familiar companions; and the question is being asked of the electors of Rochester whether they think it quite correct for the German manufacturers to dump their surplus product freely on the English market, while English cement is kept out of Germany by a 10s. protective duty. Such questions as this go home to the working-class voter.

Meanwhile, it is important to note that one of the most valuable Government publications of modern times, in the form of the familiar Blue-Book, has just been issued by the King's Printers. It is headed "British and Foreign Trade "and Industry," and comprises memoranda, statistical tables, and charts prepared in the Board of Trade for the elucidation of various matters bearing upon British and Foreign Trade and Industrial Conditions. It is a wonderful piece of work, performed in about ten weeks, in order to provide material that may help in the consideration of the question of the day. This is not the place for any comment on the contents of the book, which are largely answers prepared in response to specific questions addressed to the Board of Trade by Ministers. Another opportunity will be found for introducing some of this valuable matter to the attention of "JOURNAL" readers. For the moment, the existence of the book is sufficient proof of the reality of the inquiry into the question on the part of the Government. Of course, no single collection of data could exhaust the subject; but in this volume Sir Alfred Bateman, the Controller-General, and Mr. Llewellyn Smith, of the Commercial, Labour, and Statistical Department, have striven manfully to cram as much information as possible between the paper covers. There appears, by a cursory glance, to be a good deal in it about selling commodities for two prices, among many other interesting things.

### A Coalowner's Views of Gas Coal Buyers.

THE familiar aspiration expressed by Scotland's bard, that we might be given the doubtful advantage of seeing ourselves as others see us, has always struck the judicious mind as hastily conceived. When one thinks it over, there appear to be several conditions which would have to be satisfied before such a gift could be really appreciated by imperfect humanity. The most obvious of these is, that the picture seen from a detached point of view should be recognizably true, which would not often be the case. Half the misunderstandings which cause so much trouble in the world are attributable to the simple truth that the outside views of one another which we habitually take, are no more likely to be correct than those we form of ourselves. Still, it is always interesting, and sometimes helpful, to get an occasional glimpse at our actions through other people's eyes; and this can be contrived by giving attention to any candid description inspired by such observation. Recently, some faithful testimony respecting the ways of buyers of gas coal was given by Mr. W. Hargreaves, the President of the National Association of Colliery Managers, in the course of his Inaugural Address to the members of this body, meeting at Leeds. It must be good for the subjects of the illuminating observations of Mr. Hargreaves, who hails from Rothwell, near Leeds, to know precisely what place they hold in this representative colliery manager's esteem. It is perhaps matter more for regret than for surprise that this place is not an elevated one. Indeed, it can hardly be much lower, which requires an explanation.

Mr. Hargreaves said, in effect, that even the troubles that afflict colliery managers in connection with their labour are largely attributable to the bad example set by the buyers of gas coal. As how? Well, the demonstration is rather shaky as to its logic; but the speaker's meaning is clear enough. He starts by complaining that the labour leaders in the trade regard the law of supply and demand as exploded, and consider that all that is necessary to secure the prosperity of the colliery interest is for the employers to start from the foundation of a living wage for the miner, and make their prices accordingly. This arrangement implies the combination of coalowner and labour leader, in the power of which the colliery interest is to defy the world of buyers. Then he proceeds to state that this exaggerated idea by the labour leaders of the power of combination has, in his opinion, been formed upon observation of the effect of outside combinations on the trade; and he forthwith cites the gas coal branch in illustration of his point. Mr. Hargreaves declares that "the drop in prices in this important section of our "trade has been more pronounced than in any other, and "there is no doubt that to-day's gas coal prices are dis-"tinctly unremunerative to the coalowner." This news will be received by consumers of gas coal with different feelings from those which Mr. Hargreaves experienced so acutely. It is an assurance, by an unwilling witness of truth, that gas coal has been generally bought this year remarkably well. It is not often that the purchasing agents of gas companies and municipal gas departments receive such a testimonial of their business ability; and they are entitled to be proud of it. As to the prices in question being unremunerative, that is no concern of theirs. There was no sort of compulsion put upon the coalowners to sell at the figures so characterized. But this is not all. The gas coal market, as Mr. Hargreaves admits, should be an easy one for sellers to keep at a paying level. The volume of the demand is known; and there is no foreign competition bogey in the case. Why then, he asks, did prices fall so low? Agreeing that the chances of making "fair" contracts for gas coal are all on the side of the coalowner—as buyers have often had occasion to know, to their cost—why

has the coalowner been beaten down this year by the purchaser, more particularly the municipal buyers so prominent in the district for which Mr. Hargreaves speaks?

Having regard to his introduction of the subject, it might be expected that the explanation offered would have referred to the existence of something strange and unholy in the form of a "combination." It never mentioned the subject, but was confined to a vague accusation that the municipal buying was done in some "tricky way." It is difficult to ascertain, from the only description that is vouchsafed by Mr. Hargreaves of how this business is transacted, where the trickiness comes in. All he said was, that after the tenders are received, an opportunity is offered for amending the prices, "and then commences a system of bartering, quite "opposed to the spirit of contracting by tender," which he denounces as "unfair trading." Really, Mr. Hargreaves doth protest a little too much, and his great disclosure is very like a mare's nest. As we have already remarked, having suggested that combinations were the bogey of the trade, he drops the subject, and illogically bases his complaint upon the survival of what is called by writers on economics "the higgling of the market," which is the orthodox panacea for eventually arriving at fair prices. If Mr. Hargreaves means to imply that in the giving out of gas coal contracts the buyers ought to take no account of anything but the figures of the tenders sent in on the usual invitation, he is asking too much. There are such things as "rings," as well as combinations.

The truth of the matter is that the drop in the value of gas coal this year may be best explained, after all, by reference to the good old stager of economics, "supply and "demand." Buyers were not so eager; and sellers were more so. While more miners than ever were raising coal, and producers had more to dispose of, the wants of many gas undertakings were less. This was partly due to the checked consumption of gas so universally experienced, and partly to the circumstance that many large purchasers had overbought the previous year. That is the long and the short of it. Our contemporary the "Iron and Coal Trades "Review," in echoing the disgust of Mr. Hargreaves at the lack of respect shown by gas coal buyers for the figures of tenders, finds an additional reason for the weakness of the market in the practice of private buying. Who is responsible for this expedient? The "ring-masters" of the district, wherever it may be. Not long ago, the agent of a large Gas Company, not liking the look of the figures of the tenders sent in as usual, made inquiries outside, which resulted in the whole of the year's purchase of coal going into fresh fields. In face of such facts, the aspersions will not disturb the equanimity of the subjects of them.

## Gas Managers at Newmarket.

THE meeting of the Eastern Counties Gas Managers' Association last Wednesday at Newmarket will turn an unusual amount of interest on that town from the ranks of the gas profession. The sincere cordiality of the reception that the visitors met with, and the whole-hearted support given to the President (Mr. J. H. Troughton) by his Chairman and Directors and the members of the Association, had a parallel in the exceptional excellence of the technical matter which engaged attention at the business meeting. The address with which the President inaugurated his year of office is difficult of adequate description. It was a composition of variegated subject, and meritorious in the extreme. As the President of the Institution of Gas Engineers (Mr. H. E. Jones) put it, it was an address worthy both of the Association and its author; and Mr. Jones, old past-master that he is in this kind of work, must surely be accounted a competent judge. The address contains interest both local and general. In gas politics, the President is clearly a progressionist of the broadest stamp; and his wide-awake interest, study, and initiative have made a marked impression upon the policy of the Board of his Company and upon the fortunes of the latter, in witness whereof stands the statistic in the address showing the advance of gas consumption and the cession of a substantial part of the prices charged only a few years since. At first blush, the figures to which attention is directed suggest that the business has not progressed neck-and-neck with the capital expenditure; but the big increase of the latter—the point is not sufficiently emphasized by the President—is merely the result of the conversion of the capital, in 1895, into a 5 per cent. stock. Mr. Troughton's methods of enhancing the vigour of the Company's business are delineated in his deliverance, and are well worthy of the readers' consideration.

The immediate local matter of the address is supplemented by a question, or rather a grievance, in which the President found among his auditory some who could extend to him the sympathy of fellow-sufferers. The rates per ton charged by the Great Eastern Railway for the carriage of coal and merchandise, he proved, with a statesmanlike directness that does not appear to admit of refutation, are as unbalanced, on the mileage basis, as they well can be. They seem to be governed, as between town and town, by no settled rule. This presses hardly on those gas undertakings which have to pay the higher rates, as the excess, in comparison with those undertakings on the Great Eastern system which receive more lenient treatment, means a very sensible difference in the amount which must, from this cause alone, be charged for gas. Not only in connection with the conveyance of coal, but in the matter of coke, the Eastern Counties gas undertakings have good ground for complaint. The Great Eastern Company refuse to transport coke in their own waggons; yet there is no difficulty in getting it into the district from towns on other lines, nor do those concerns on the Great Eastern line which are in the fortunate position of owning trucks find any trouble in passing their coke into towns served by less fortunate concerns. The President dealt with these matters in a manner which furnishes an excellent case for some united action being taken. The gas undertakings in the Eastern Counties should not overlook the fact that Sir William T. Makins, Bart., is a Director of the Great Eastern Railway; and as Governor of the Gaslight and Coke Company, his sympathy may be gained for the cause of reform in these respects. It is not an uncommon sight to see on the Great Eastern Railway coke-laden trucks bearing the name of the Gaslight and Coke Company; but we should be sorry to suggest that this fact is sufficient to convince Sir William that the Railway Company he assists in directing should have rules which favour the strong to the detriment of those in weaker circumstances. As compensation for any equalization of treatment which the Company may feel disposed to effect, the President, it is seen later in the address, is prepared to offer them a "tip" from Newmarket which will "save the Company an enormous sum of money—"probably not less than £50,000 per annum." This cannot be such an insignificant matter to Sir William Makins and his colleagues that they can afford to ignore it. We hope to hear, now that public attention has been called to these matters, of some amendment being made by the Railway Company in their treatment of the gas undertakings in the Eastern Counties.

Among subjects of wider interest, Mr. Troughton dealt with the suggestions made by Mr. Andrew Dougall in his Presidential Address to the Institution of Gas Engineers as to the future work of that body—more particularly the suggestions relating to the affiliation of the District Associations with the Institution, and the centralization of all cognate organizations. The Council of the Institution will not fail to note this examination of their President's proposals by the observant head of a District Association. But in his allusion to centralization, the President instanced the Gas Companies' Protection Association, and lamented the fact that it had not received the financial support it deserved. This raises a point over which many have marvelled besides Mr. Troughton. But all the marvelling in the world will not disclose the secret of the cold-shoulder which many companies—and important ones too—have turned against the Association. It cannot be that the objects do not commend themselves; and if this is not the case, then what is the reason? There must be some means of ascertaining the cause of this restrained attitude on the part of so many companies; and, for the sake of increasing the already proved usefulness of the organization, it might not be a disadvantage if a little private inquiry were made by the members among those who are holding aloof. If there is any real cause, it may be one that is not beyond remedy.

We have touched lightly upon a few of the matters contained in this versatile address; and beyond this, much as other points invite attention, it is impossible to go here. But our appreciation (which will be shared by the gas profession generally) of the contribution to the proceedings by Mr. Samuel Cutler, jun., must be acknowledged. It was a paper of imposing technical interest, and on a subject—that

of steel building construction in gas-works—which is forcing itself, by the changing circumstances of the times, more and more upon the attention of gas engineers. This method of construction lends itself admirably to the housing of those processes in gas-works which demand the erection of buildings of greater height than under the old order of things. The examples of the various types of these steel structures, the details, and the drawings and photographs, presented by Mr. Cutler, will be of extreme value. Unfortunately, the members had not had the advantage of the practical experience of the author; and the discussion suffered in consequence. But it had the one good effect of extracting from him, in his reply, some information on the important question of cost. Sufficient comment has been made to show that this meeting at Newmarket has produced material which merits, and will undoubtedly have, the close consideration of many besides those who were in a position to be present.

## British Association Proceedings: A Paper on Municipal Loans.

THE transactions of the British Association this year, apart from the discussion of radium, were of the usual character, which is as much as to say that most of the mental pabulum provided was "hash." The programme of a British Association meeting is, as a rule, made up of one striking novelty—the discovery of the year, in point of fact—and the rest is stale. This is the year of radium; and beyond it there was nought. Mr. Swinburne had a relapse into entropy. But the attack was of a mild character; and both the patient and his faithful attendant, Professor Perry, are by this time convalescent. Very few of the papers read at the meeting possessed any special interest for "JOURNAL" readers; and only two bore specially upon gas supply. One of these was by Mr. S. H. Turner, which dealt with the question of the sinking funds of municipal undertakings, and reserve and depreciation funds. The author, who is of the Glasgow University, stated the case very clearly. While sinking funds, for repaying the capital of municipal undertakings, are obligatory, without exception, there is no obligation on local authorities to provide reserve or depreciation funds. Consequently, while a very few municipal trading undertakings have adequate reserve or depreciation funds, the great majority have nothing of the kind. Those municipalities which do not set aside anything for depreciation plead in excuse that the sinking fund is sufficient, and that so long as the original capital is paid off by the time the plant or machinery purchased with it is worn out, the requirements of justice are satisfied. If another generation wants to renew the property, it must arrange to raise more capital for the purpose, and pay it off in due course. And so on, *ad infinitum*.

Much the sounder financial view is that the value of the investment should be maintained out of the business, as in the case of a private concern; the provision of a sinking fund being regarded as an extra requirement of Parliament to prevent the creation of a permanent local debt. The objection here is that this arrangement makes the first generation of municipal borrowers pay for the capital twice over—first to repay the whole debt, and secondly to provide as depreciation allowance an equal sum which would be presented to their successors as a free gift. This view of the case is merely an illustration of the fact that the actual financial arrangements of local authorities are not suitable for the necessities of a reproductive business. What has happened in this regard is that a system of finance which was quite right and proper for the purposes to which municipal loans were at one time restricted—sewerage works, street paving, the provision of a steam road-roller, and so forth—falls out of joint when the application of the money is industrial.

The remedy suggested by Mr. Turner is to distinguish more thoroughly between the sinking fund as a means of preventing the creation of permanent local debt, and the depreciation provision whereby the value of a reproductive undertaking with a capital of this redeemable character is to be maintained. He thinks that the period of the sinking fund should not be based in any way upon the probable life of the assets representing the borrowed capital, but that the provision of a depreciation fund should in many cases be obligatory. The suggestion is a helpful one, if only as tending to enable the municipal mind to perceive what is the nature of the difference between the universal institution of the sinking fund for municipal loans, and the system by which the value of a going concern is maintained out of revenue. The difficulty would arise in regard to determining the period for the repayment of loans, which all local authorities would wish to spread over at least two generations. This desire is dead-against the sense of Parliament, which has pronounced against any extension of the period for which local authorities draw on the credit of the future. It is, moreover, questionable if greater facilities for getting into debt than at present exist should be offered to local authorities—at any rate until the full effects of the modern fashion of municipal trading are disclosed, which may be before long.

## The Prospects of Gas for South Africa.

THE echoes of the last shots that were fired in anger in South Africa have not long died away, and already the schemes of industrial and commercial development for this hitherto mysterious continent are assuming a scale of importance, and displaying a character, transcending the wildest dreams of the pioneers of the last century. One of the most striking of these projects is for the utilization, as a source of motive power, of the enormous potential energy of the Victoria Falls of the Zambesi, which few white men have as yet so much as looked upon. It is known, however, that humanly speaking this water power is illimitable, being far in excess of that of Niagara. The fall is over 400 feet, and the flow merely a matter of guesswork for the present; the significant figures being certainly of astronomical magnitude. The knowledge of this branch of hydraulics gained at Niagara will therefore serve as the basis of a still vaster enterprise of the kind. Moreover, there is no occasion for hurrying the matter. During unnumbered centuries the magnificent inutility of this waterfall has spread itself unnoticed underneath the steadfast sun and stars; and now there is a likelihood of its being turned to the account of civilization, it is well the foundations of the new order of things should be well and truly laid, to supply the needs of a future which has scarcely dawned upon the continent.

Our present interest in this subject arises out of the reflection that, if this water privilege, and others only smaller by comparison, as the falls of the Orange River, can be made to subserve the proposed purpose, Africa bids fair to furnish the example of a land not dependent wholly upon coal for making its labouring wheels go round. This thought further suggests an inquiry as to how far the gas industry, as we understand the term, is likely to be extended in industrial Africa. Now, what part is gas competent to take in this portentous development of a virgin territory under the impulse of the very newest spirit of civilization—in a form which has nothing to copy, but must be adapted to an environment not yet in existence? It is a curious, but by no means an idle, inquiry. For civilized and populated Africa will need artificial light; and some means of obtaining that handy and manageable heat without which civilized man can nowhere either subsist or work, whatever the climate in which is his dwelling-place. There is not much need for artificial warmth in this part of the world, which at once renders superfluous a great deal of the work thrown upon the inhabitants of colder regions. It is probable, nevertheless, that there will be many more gasholders constructed in South Africa before the century is out. The nearest analogue to this country is Australia; and the gas industry of Australia and New Zealand is prosperous and growing.

On the whole, therefore, notwithstanding one or two rather discouraging symptoms, which it is unnecessary here to descant upon, and the intimation that electricity generated by water power is to be made available throughout an extensive district on a scale unparalleled in the Universe, it is possible to believe illuminating and heating gas has a certain future in the youngest of continents, speaking in the industrial sense. This is not to say that gas can be "boomed" in this part of the world with much hope of securing extraordinary profits, nor that gas engineers as such are likely to prove Rhodesia to be a way of reaching Park Lane—which seems to be esteemed the Earthly Paradise of this age, *vice* the Champs Elysées, outclassed. It only signifies that gas engineering may be expected to be in more or less demand for South Africa, as its waste places are built over, like other and better-known regions of the Earth's surface have been up to the present time.

## The Projected Crystal Palace Exhibition.

The preliminaries connected with the proposed Gas Apparatus, Lighting, and Heating and Smoke Abatement Exhibition, to which reference was made in the "JOURNAL" for the 1st inst., are unfolding themselves under the direction of Mr. G. Collins Levey, C.M.G., the Crystal Palace Company's Organizing Commissioner. We learn from him that he fully recognizes the importance of securing the co-operation of the representative organization of the gas industry, and that he will not leave a stone unturned to obtain it. If this co-operation is realized, it will be the seal of success, as the gas plant and appliance manufacturers throughout the country will do their utmost to make the exhibition one worthy of the industry they serve, if the Council of the Institution, or any Association of the gas profession, decide in its favour. Mr. Levey has already had an interview with Mr. J. W. Helps, the Hon. Secretary of both the Institution and the Southern Association, and has since sent him an official communication on the subject; so that we may expect to hear definitely very soon whether or not the industry will be officially identified with the project. If it is, the Institution must, of course, act in an advisory capacity, and have some control in the organization. It is altogether unlikely that there would be the slightest difficulty in arranging this. A rough draft of the prospectus that has been prepared by Mr. Levey to explain the character of the display the Crystal Palace Company are contemplating, presents a very comprehensive scheme; and it may perhaps be made even more so if the Institution take it in hand. To carry it out, there is no time to be lost. The matter has been somewhat delayed through the deaths, within a few months of each other, of the General Manager and Secretary of the Palace Company; but Mr. Levey and his assistants are evidently prepared to throw into the work a large amount of energy, and all the time now at disposal. But the main thing for them is to obtain—and we insist upon the importance of this—the countenance and help of the Institution or other Association of the gas profession. Irresponsible organization in the past has made this —no matter how good the position in other respects of the new organizers—an indispensable condition among our manufacturers of standing. Directly this was pointed out, the Organizing Commissioner of the Crystal Palace Company took steps to put them right in this respect. In considering the matter, it should not be forgotten that they have made their arrangements for holding the exhibition; and the earnestness which is being displayed, in taking the steps referred to before approaching the manufacturers, leads us to hope that the Organizing Commissioner will now find what he is seeking—and that is, hearty co-operation.

## A Suggestion for Gas Directors and Committees.

Much has been written lately with the object of assisting in putting an end to the mischievous system that has spread through the gas industry of asking for and receiving gifts (sometimes voluntarily offered, sometimes otherwise), at different periods of the year from firms trading with gas undertakings. It has come to such a pass that it has got beyond threatening rectitude n business relations; and we know of cases where it has put an effectual brake on free trade. This, gas directors and committeemen must be aware, is not in the interests of their undertakings; and therefore they should exercise their power and do something towards purifying in this respect their commercial transactions. Warnings on the subject should be issued to all employees, and anyone found violating the will of the Directors or Committee in this matter of soliciting or receiving should have punishment meted out to him that will serve as an example to others. Something further can be done. Rumour informs us that one important gas company—and this is the suggestion we desire to specially call attention to—are considering a proposal (whether they have come to a determination on the point we are not quite sure) to communicate with all the firms with whom they do business, requesting them not to send to any of their employees, official or subordinate, anything in the way of a present at Christmas time. This, if carried out, will be taking a practical step in the suppression of the pernicious evil. On receiving such a communication from head-quarters, trading firms would not, if they have any consideration for their own interests and those to whom they have been making presents, attempt to continue the illicit system. Those who did not observe the request would do so at their own risk. They would not only be placing those who received gifts from them in jeopardy, but their own business connection with the undertaking would be endangered. And, in the circumstance, it would serve them right if discovered. The system is pressing hardly on many trading firms who have had anything to do with it; and if gas committees and directors take some general action such as this, the firms would—or the greater part of them would—be only too glad to do their share. Small beginnings (for what purpose?) have brought upon them a swarm of parasites, whom—competition being to-day so keen, and prices in some departments of the trade cut very fine—they are afraid to offend. Only recently a meeting of gas-stove makers, as stated soon after, was held to discuss this question; and we had hoped that before this there would have been some definite announcement from them as to their united intentions. A few words more. There are numerous chief officials to whom a trader would not dare to suggest or offer a gift of any kind; the same cannot be said of many of those chief officials' subordinates. The year has not been unproductive of sorrowful experiences in certain ways for a few men in the industry. The reason is an open secret. They are simply the unfortunates among many who—perhaps for a time only—are more fortunate. We have shown here how gas directors and committeemen can help in the suppression of this evil. Will they adopt it?

## Gas Affairs in Glasgow.

Elsewhere we notice "The Sad Case of Mr. John Wilson," who has been called upon by the Corporation of Glasgow to tender his resignation of the management of the Tradeston Gas-Works. There were other matters of importance dealt with at last Thursday's meeting of the Town Council; the annual meter contract affording the occasion for some plain speaking regarding the dealings of apparatus manufacturers. It is more than doubtful, however, if credence should be placed upon all that was said. In such matters, there is always another side to the question; and members of the Corporation of Glasgow are not likely to know all the conditions of membership of a trade ring which was, it is said, formed to keep up prices. The discussion reported elsewhere is chiefly valuable as an illustration of how even a Corporation of enlightened business men may oscillate from one view to another when they have no strong hand to guide them. The same feeling comes uppermost in connection with the consideration which was given to the annual accounts. These were in all respects satisfactory, and would have been adopted but for the question of the price of gas. When it was reached, there was simply chaos; and it was necessary to adjourn consideration of the subject. Differential rates for gas are distasteful to many of the councillors, and there was no one of authority who could direct their thoughts. There was, in this matter, truly reason to long for "the touch of a vanished hand."

## The National Free Labour Association.

Trade Unionists are not to have all the "congressing" to themselves, for hardly has the last echo of their much-advertised proceedings at Leicester died away, than there comes the announcement of a perhaps equally important, even if far less pretentious, annual congress of the National Free Labour Association. The object of this Association, as the name implies, is to promote industrial welfare by maintaining the right of men to work for whom they please on such terms as may appear satisfactory to them—which, of course, brings them into direct conflict with existing Trade Union ideas. The task they thus set themselves has been a difficult one—how difficult will be easily recognized by those who have unfortunately been forced to give attention to this aspect of the labour question. It is stated by the Executive Council that their mission is not the destruction of Trade Unionism, but its "purification from serious and compromising anti-economic anomalies," which have made it "a menace to good order, a wrongful restraint upon human rights and liberties, and a positive danger to the Commonwealth." The Association is about to hold its eleventh annual congress; and during the time it has been in existence it has proved a veritable "friend in need" to a large number of employers who have found themselves and their workmen caught in the toils of Trade Union tyranny. The recent strikes in which assistance has been rendered to the masters, include some notable struggles; and in many cases the prompt aid which the officials have been in a position to furnish

has been the means of utterly defeating the aggressive tactics of the Unions. With regard to some of the instances quoted, it is difficult to decide which is the more remarkable—the stupidity of the men who went on strike for such inadequate reasons as are assigned, or the promptness with which the Association replaced the disaffected hands. The usual course is, immediately on receipt of a request for help, for some members of the "emergency staff" and a competent cook to be despatched to the scene of operations, to arrange for the housing and accommodation of the new men, who are generally not more than one or two days later in putting in an appearance. The results which have attended the work of the Association in this country have led to the General Secretary being approached with a view to visiting America in order to organize free labour on similar lines there; and this fact, together with the record of some five hundred strikes successfully combated during the past eleven years, is sufficient proof of the seriousness of the movement. In view of the possibility of trouble arising with their men, gas managers should be careful to remember the existence of so useful a body as the National Free Labour Association.

### Councillors Surcharged at Shoreditch.

During the recent sittings of the Joint Parliamentary Committee on Municipal Trading, considerable attention was (as will have been seen from the report of the proceedings which appeared in last week's "JOURNAL") devoted to the question of surcharges by the Local Government Board Auditors; the argument being that the fear of such surcharges prevented many suitable men from becoming town councillors. Under these circumstances special interest attaches to the unhappy fate which has overtaken fourteen members of the Shoreditch Borough Council, who have been surcharged £6198 by Mr. A. C. Roberts, the Auditor. It appears that the Finance Committee, having made up their estimates, proposed a half-yearly rate of 3s. 10d.; but these fourteen gentlemen voted for a rate of 3s. 8d.—thus reducing the receipts by the amount named below the sum required to meet the estimates. This they did in spite of warnings as to the probable result of their action; the idea being, it seems, to postpone the payment of certain sums till the next half year, when it was expected that the expenses would not be quite so heavy. But, however laudable an object this may have appeared in the eyes of the councillors in question, it did not appeal to the Auditor, who, after addressing to each one a request for an explanation of his conduct, has taken the extreme step stated above. Since the intimation of the surcharge, however, the members concerned have fixed the rate for the next half year, and have included in it the whole of the deficiency. In this way it is probable that they have got over the difficulty, for if the shortage is to be made good out of the rates, there will be no need for the councillors to make it up a second time out of their own pockets. Of this, however, it is impossible to speak with certainty at present, but more will doubtless be heard of the matter. The incident shows, at any rate, that the fear of surcharge is not altogether an imaginary one, though the fact that the Local Government Board Auditor has put his foot down so decidedly on this little piece of municipal finance, should not afford any valid reason for men of good position refusing to serve on those local authorities which are subject to this official audit. If the present fright should make the members of the Shoreditch Council more careful not to spend money that they are not prepared to promptly ask the ratepayers to pay, the action of the Auditor may not be without benefit alike to the councillors and to their constituents.

### Sir F. Bramwell and the Steam-Engine.

Those who are acquainted with Sir Frederick Bramwell's views on the future of the steam-engine, must recognize a fine humour in a letter which he addressed to the British Association offering a sum of £50 to be invested and offered as a prize by the Association half-a-century hence for the best paper on the then condition of the steam-engine. On numerous occasions Sir Frederick has stated his firm opinion that the days of this method of producing power are numbered; and at the Jubilee Meeting of the British Association more than twenty years ago, he ventured the prophecy that in fifty years' time steam-engines would be found only in museums. If this prognostication should be fulfilled, there will not be much to be said on the subject at the time Sir Frederick now fixes. But perhaps, in spite of the rapid advances of gas as a motive power, the steam-engine may die a little harder than he thinks. Unfortunately, the Association have some doubts as to whether they are legally competent to undertake the trust; but the offer has enabled Sir Frederick to once more draw attention to the very decided views which he holds.

## WATER AFFAIRS.

### Water Topics at the British Association.

IT cannot be said that subjects connected with water supply figured very conspicuously in the programme of the recent meeting of the British Association. The selection of Mr. Charles Hawksley as President of the Engineering Section was, however, sufficient guarantee that this question would not be neglected; and, as a matter of fact, the larger portion of his opening address, to which we hope to give more specific attention in a subsequent issue, was devoted to it. The author showed his auditory, which consisted of a fairly representative gathering of the members of the Association, how a supply of water is brought from its source to the houses of the consumers, and then distributed therein; and in so doing he dealt incidentally with internal fittings, intermittent as compared with constant supply, and the examination of water. His remarks on the last point are given in another column; and it will be seen therefrom that he had the courage to express the opinion that the public are sometimes unnecessarily alarmed by the published results of various chemical and bacteriological investigations, and that water which is now considered to be of doubtful character will in the future be found perfectly good and wholesome. Mr. Hawksley bases this opinion upon the fact that towns which have for many years been supplied from sources now regarded with suspicion, are in a very healthy condition. Beyond his statements on this point, and his remarks on the recommendation of the Royal Commission on Sewage Disposal in regard to water supplies, there was nothing of a controversial nature in either his address or the water papers read in his section. Mr. Joseph Parry, the Water Engineer of Liverpool, and Professor J. Campbell Brown, the Public Analyst of the city, furnished some particulars in regard to the water of South-West Lancashire; the latter gentleman dealing mainly with the occurrence therein of certain peculiar organisms depending for their development upon the presence of a compound of iron. Fortunately, they have no deleterious effect upon the health of the consumers; only they are unsightly, and therefore require repression. Mr. Parry also read an interesting paper on a subject which he has for some time had very much at heart—the afforestation of the catchment areas of water-works, with the view of minimizing the risk of pollution of the sources of supply. Judging from his experience in Liverpool, he thinks gathering-grounds could be planted not only with great advantage to the country, but also with profit to the owners of the works.

### Typhoid Fever in Belfast, and its Cause.

WHATEVER may be the value of afforestation in preserving the catchment areas of water-works from contamination, the necessity for ensuring such preservation has been very forcibly shown in a voluminous report just presented to the Public Health Committee of the Belfast Corporation by Professor J. Lorrain Smith, M.D., on the subject of the occurrence of typhoid fever in the city. It appears that since 1889 the community have suffered from a typhoid mortality more than twice as great as that of the preceding eight years; and Dr. Lorrain Smith has endeavoured to ascertain the cause of this remarkable increase. His investigations have led him to the conclusion that it is closely connected with the water supplied to the city from the Stoneyford works. The justness of his conclusion is being much criticized; but, whether it is right or wrong, there is a very pertinent fact to support it—viz., that the year 1888 was the one in which the supply from this source was connected, and the last in which typhoid was moderately in abeyance. Curiously enough, concurrently with the rise in the typhoid rate, the general death-rate has steadily fallen. Now, this particular form of fever has been prevalent at

Stoneyford in recent years, and it appears that there have been no proper means of dealing with the cases when they occurred, or with the general sanitary condition of the catchment areas; and a considerable amount of resistance has been offered by the inhabitants to being disturbed "merely "for the sake of sanitation." This has been a serious difficulty in the way of the Water Commissioners, in their efforts to ensure the purity of the supply; and since 1899 they have spent large sums in the purchase of portions of the area, in order to obtain control over the pollution of the ground and the sanitation of the parts immediately adjacent to reservoirs and streams. This measure, however, is only a partial one; and Dr. Lorrain Smith says the sources of pollution that remain are more numerous than those already bought up. Over the former the Commissioners do not, unfortunately, appear to have any effective control.

While the circumstantial evidence adduced by Dr. Lorrain Smith seems to justify his indictment of the Stoneyford water, there are certain features of the domestic life of Belfast which it is not unfair to assume contribute in no small degree to the production of conditions favourable to the propagation of typhoid fever. His report discloses the unpleasant fact that in one of the five areas selected by him for carrying out his investigations, 73 per cent. of the drains were defective; while in the others the percentages were 47, 37, 33, and 32. These defects were in certain cases found in comparatively new property. Dr. Lorrain Smith acknowledges that such conditions as these make it easy for typhoid to find a footing in the city; and he states plainly that, while they remain, the inhabitants cannot expect the degree of freedom from the disease which ought to exist. At the same time, he says the investigation of the experimental areas failed to afford evidence that the peculiar burden of disease laid upon the city was due in the first instance to the defects specified. Nor was the milk supply to be held responsible for it. Dr. Lorrain Smith cannot find any other cause of the trouble than the Stoneyford water; and yet, though the County Gaol has been supplied with it since the reservoir there was first brought into use, we learn on good authority that not a single case of typhoid fever has occurred within its walls—not because special precautions have been taken to secure immunity from the disease, as the water is used unboiled, and in large quantities. One would naturally suppose that if it carried with it pathogenic germs, some of the inmates of the establishment would certainly have been affected by them.

In entering upon the investigation of this serious question, it looks as though Dr. Lorrain Smith had done so with a foregone conclusion; and we think the citizens of Belfast would do well to place against his rather alarmist report the regular analyses made by Dr. Percy Frankland of the water supply of the city, which show that it is now, and has been for some time past, beyond suspicion. These should have a reassuring effect upon them. Though we cannot accept all that is contained in the report, we can cordially endorse its final conclusions—viz., that the sanitation of the catchment areas of the older water supply should be thoroughly reorganized, so that the Water Commissioners would have sufficient power to deal with the general pollution of streams, the stamping out of typhoid fever (which is endemic in Stoneyford), and the treatment of cases by isolation; and that they should, as soon as possible, convert the Mourne area into the primary source of water supply for the city. Some time must necessarily elapse before the latter recommendation can be carried out; but the former may be taken in hand promptly—and the sooner the better.

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**An Appreciation of the Late Mr. Foulis.**—After the portions of the report of the Gas Committee of the Glasgow Corporation which appeared last week (p. 690), reference to the late Mr. Foulis was made in the following graceful sentences: "The Committee cannot close their report without again referring to the great loss which the Corporation has sustained through the sudden and unexpected death, on the 29th of June last, of Mr. William Foulis, their Engineer and General Manager, who had been in the service of the Corporation for the long period of 34 years. His work was performed with increasing value to the department over which he so ably presided; and he will be missed alike by the Committee and his colleagues in the management and development of the Corporation gas undertaking. The Committee are proud to think of him as a faithful, upright, and energetic servant, whose life's-work has contributed so largely to the prosperity and progress of this great and growing Municipality."

# ESSAYS AND REVIEWS.

## GAS ACTS FOR 1903.

According to custom, we to-day give an abstract of the principal contents of the Private Gas Acts of the year, beginning with those incorporating companies either newly formed or not previously carried on under statutory conditions.

The Bridgwater Gas Act is of an exceptional character, inasmuch as it is for continuing the Bridgwater Gaslight Company, incorporated by an Act passed in the fourth year of the reign of King William the Fourth, and not since been in Parliament. By this Act the Company's capital was limited to £4000 in shares and £1300 loan. Despite this limitation, the Company called up £3100 of additional share capital between the years 1837 and 1853. Between 1844 and 1883 further sums, amounting to £10,900 in all, were appropriated from undivided profits for capital purposes, which brought up the account to £18,000. Since this date, £18,596 more has been taken from profits in the same way; thus raising the total outlay on capital account in all forms to £37,896. Besides this, the Company have made use of £5500 as working capital. A structural valuation of the works and property of the undertaking amounted altogether to £37,240. The net earnings for the past five years have averaged upwards of £3290 annually. Under the old Act, the Company were not limited as to the amount of their dividends, nor restricted as to price or illuminating power. The present Act repeals the old one, and defines the area of supply as lying within a radius of 1½ miles from the Borough Market House in Bridgwater. The capital is increased to £84,000, divided into classes as follows: The original stock "A" amounts to £18,000, and there is £24,000 of improvement stock "B," created in respect of moneys expended out of revenue upon extensions and improvements and working capital. The foregoing are deemed to be fully paid up, and are to be rateably distributed among the old proprietors. The balance of £42,000 is new stock "C." Both the improvement stock and the new stock bear a 5 per cent. dividend. The sum of £12,700 may be borrowed on the old capital, and one-third of the amount of the new issues. Compulsory powers of land purchase and severance are granted, for three years. The standard price of 14-candle gas is 3s. 6d. per 1000 cubic feet, tested at the 5 cubic feet rate on the works or within 200 yards thereof. Consumers' fittings may be specified. Discounts not exceeding 15 per cent. are allowed. The Corporation may within twenty years promote a Transfer Bill unopposed, on specified terms. The Company reserve, as not forming part of their undertaking liable to be purchased, all cash in hand, securities for money, the amount of the reserve fund, and all undivided profits and surplus stock in trade; also all the profits and rents and book debts, and the private books and papers relating solely to the proprietors. A map of the mains is to be made within six months and produced to the Town Clerk.

The Burgess Hill and St. John's Common Gas Act incorporates a Company formed in 1867, with a capital originally of £5000, which has from time to time been increased by special resolution, and now amounts to £7800. The limited Company have borrowed £3500. The area of supply of the statutory Company is enlarged, with reservation of the right of the Brighton and Hove Company to supply gas in the parish of Clayton. The capital is increased by £10,200, bearing a 7 per cent. ordinary or a 5 per cent. preference dividend. Not more than £13,200 is to be raised in this way, including premiums. [This is exceptional, to make the amount of the premium capital extra to the stated amount of the "additional" capital sanctioned.] The borrowing powers are in the proportion of one-third. The quorum of general meetings is stated. Power is given for the construction of a railway connection with the works. The maximum price of 14-candle gas is 5s. 6d. per 1000 cubic feet, with discounts not exceeding 15 per cent. Pipes may be laid for ancillary purposes. No penalty is to be incurred by the Company in case of unavoidable cause. Consumers' fittings may be specified.

The East Ardsley Gas Act incorporates a Company formed in 1871, with an Order of 1872 which limited the share capital to £6000. Notwithstanding this limitation, the capital was increased to £12,000, and the Company also borrowed £1200. The Order is repealed. The capital is increased to £24,000; the previous share issues being confirmed and made to bear a 10 per cent. dividend. Premiums are not to be treated as profits, but are to be reckoned as part of the paid-up capital for borrowing purposes or the creation of an insurance or renewal fund. It is optional for the Directors to annually appropriate out of the revenue, and as part of the expenditure on revenue account, any sum not exceeding 1 per cent. on the paid-up capital for the time being, to be called the "renewal fund." This fund may amount to 10 per cent. on the paid-up capital, and not exceed £2000. The borrowing powers are in the proportion of one-third. The standard price of gas is 4s. 6d. per 1000 cubic feet. The prescribed number of candles is to be 16, or such other number, not being less than 14 or more than 16, as may be agreed between the Company and the Urban District Council; "and in making tests for illuminating power, the gas shall be burnt at such rate as to yield the maximum light for which such burner is designed." The burner

prescribed is the "London" argand No. 1. Discounts up to 20 per cent. are allowable. Consumers' fittings may be specified.

The Market Drayton Gas Act incorporates a Company originally formed in 1861, with a present capital of £4800 and a mortgage debt of £500. The capital is increased to £25,000, with authority to borrow up to one-third. Compulsory powers of land purchase are granted for three years. The maximum price of gas is 5s. per 1000 cubic feet, with discounts not exceeding 10 per cent. for prompt payment, or 20 per cent. for large consumption. Gas of 14-candle power is to be supplied, tested at the works.

The Wellington (Salop) Gas Act incorporates a Company formed in 1851 under a Deed of Settlement. The Company obtained an Order in 1872, which authorized an original capital of £12,000 and an additional capital of £9000. The area of supply is defined. The capital is increased to £55,000 of ordinary stock, with one-third loan. Provision is made for the optional redemption of the perpetual debenture stock of the existing Company. The stock bears a 5 per cent. dividend. Pipes may be laid for ancillary purposes. The standard price of gas is 3s. 9d. per 1000 cubic feet, with 10 per cent. discount either for prompt payment or large consumption, as may be prescribed by special contract in writing between the parties. So long as the Company shall supply the whole of the public lamps in the urban district with gas, the price is to be 4d. less than that generally charged for the time being to private consumers for illuminating purposes only. Gas of 14-candle power is to be supplied, tested at the works, with a burner which may be anything approved for the purpose by the Board of Trade on the application of the Company. Consumers' fittings may be specified. With the consent of the District Council, the Company may apply for an Electric Lighting Order. The Order of 1872 is repealed.

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The Newcastle-on-Tyne Electric Supply Company's Act transfers the electricity undertaking of the Walker and Wallsend Union Gas Company to the Newcastle-upon-Tyne Electric Supply Company, Limited. The latter Company was registered in 1889, and in 1893 obtained an Electric Lighting Order for the city of Newcastle-upon-Tyne. In 1900 the Company secured an extension of area to include Gosforth. The same year, they obtained an Act which, among other things, enabled them to enter into agreements with the Walker and Wallsend Union Gas Company and also with the Walker Urban District Council. The Gas Company had electricity supply powers, dating from 1899, which were being acted upon; and their electricity capital was £70,090 without mortgage debt. The Gas Company and the Urban District Council agreed to transfer to the Electricity Company their respective electricity supply undertakings upon terms scheduled in the Act. Agreements had also been made with the County of Durham Company. The Act transfers the undertaking of the Gas Company in consideration of the payment of £2500, and the exchange of shares in the Company of equal nominal value to those of the Walker Company, but one-half in the form of preference shares. The premium of £2500 is to be applied in compensating officials for loss of office. The transfer was to take effect as from Jan. 1, 1903; the Gas Company discharging all liabilities on revenue account up to that date. The electricity supply powers conferred upon the Gas Company by the Act of 1899 are extinguished. A sliding-scale of price of electricity is enacted, with 5s. per cent. of dividend for a farthing in the price of the unit as defined by the Act of 1899. Back-dividends may be paid up to 5 per cent. Much of the Act relates to the laying of connecting mains; and there are many protecting clauses.

The North-Western Electricity and Power-Gas Act incorporates and confers powers on the Company of the same name for the purpose of generating and supplying electricity, and manufacturing and selling power gas and the residuals of such manufacture. The Company may deal in gas appliances, but not for illumination by means of power gas. Land may be compulsorily purchased within five years. The area of supply is North Staffordshire, as bounded on the south by the limits of the rural districts of Tutbury, Uttoxeter, Stafford, and Gnosall. Also that part of Derbyshire which lies to the north-west of the boundary between the Unions of Chapel-en-le-Frith and Bakewell, and portions of Flintshire and Denbighshire. Electrical energy is to be supplied under the Act only to authorized undertakers, and to persons requiring a supply for power. As regards the supply of power gas, this is obligatory in the case of a demand by the owner or occupier of any premises situate within the district of any local authority in which the Company has mains, under certain specified conditions. The Company may require any consumer of power gas to consume the same by a proportional meter of the Company's fixing, instead of by a meter according to the Sale of Gas Act, 1859. The Company are not to allow their gas to be used for illumination, under a penalty of £20 and £5 per day, recoverable by the gas undertakers in the locality. The maximum price of power gas is 4d. per 1000 cubic feet, with permission to charge ⅛d. per 1000 cubic feet more for every shilling advance on the price of suitable slack beyond 6s. per ton delivered at the works of the Company. It is not to be lawful for the Company to supply power gas that contains more than 14 per cent. of carbon monoxide, or that has not a distinctive and readily perceptible smell. The works of the Company are to be provided with testing-places for thermal power and carbon monoxide, according to prescription by the Board of Trade. The thermal power of the gas supplied is to be at least 125 B.T.U. per cubic foot at 32° Fahr. and 30 inches of mercury; the products of combustion being cooled to 60° Fahr. The powers of the Act only apply to the producer gas commonly known as Mond gas, and any development of this product approved by the Board of Trade after public inquiry. Nothing in the Act is to prejudice the right of any consumer to recover damages from the Company for breach of contract to supply him with gas. No monopoly of the supply of power gas is created by the Act. The capital of the Company is £1,500,000, with one-third loan. Before the compulsory powers of the Act in relation to the taking of land are exercised, at least £200,000 of the capital must be subscribed under binding contracts. There are many protecting clauses in the Act. The price of power gas is to be revised at any time after the expiration of ten years, on the application of any local authority within whose district a supply is given. If in any financial year the profits of the Company shall be more than sufficient to pay a 10 per cent. dividend, one-third of the surplus is to go to form a reserve fund, and another third is to be applied in making a rateable reduction in the charges to consumers as a rebate. The remaining third may be distributed as extra dividend. The Company are answerable for all damages caused by their operations. If within two years from Jan. 1, 1904, the Company have not substantially commenced their works, or if within seven years from the same date the supply of power gas has not been made effective in any district, the Board of Trade may order the powers of the Company under the Act to cease as regards the area in question. Provision is made for the removal of disused mains and the reinstatement of roads. Interest is payable out of capital for a limited time under certain conditions.

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## ELECTRIC LIGHTING MEMORANDA.

**Gas-Engines for Supplying Electricity to Road Cars—The Electric Lighting Business at Derby—The Financial Failure of Electric Lighting—State of German Trade.**

It would hardly be expected that matter of interest for gas engineers could be discovered lying hidden in a report of a run of 350 miles by electric road car; yet such is the case with regard to an experiment recently recorded. It appears that an attempt was successfully made to run a complete round from London to Bath and back, by a circuitous route, with the object of ascertaining how the car would answer. Of course, in a desperate enterprise of this nature, the first and last necessary to success is a readily available means of recharging the batteries at need. At the first halt made by the adventurous travellers, at Staines, a call was made upon an establishment which does a large business in charging electric launches. The point is, that the plant at this place consists of a 40-horse power gas-engine and two dynamos; and a supply can be obtained at all hours and of any usual voltage. So handy were the arrangements, that "electromobilists" are adjured to make a note of the address for use when in the neighbourhood. It may be a small matter for the present; but there is not a little satisfaction to be derived from the knowledge that this is a branch of business for which gas-engines are particularly well adapted. It is a use for the engine, with its instant availability at all hours, which may prove well worth cultivating in the future; for the electric road carriage is admittedly to be preferred to all others, if only the uncertainty of obtaining supplies of current for recharging the batteries were removed by the multiplication of suitable stations. This is an easy matter, as almost any shed or cellar would house a gas-engine and dynamo.

The experience of the Corporation of Derby in regard to electric lighting is noteworthy. There is no need to describe the town or its social and commercial standing. It is enough to remark that Derby should rank as a perfectly suitable place for an electric lighting undertaking. The Corporation were early convinced of this, for they started their supply of electricity for lighting in October, 1893. The concern is therefore in its tenth year—quite a ripe age, as such concerns go. The capital expenditure has run up to close upon £160,000, and it appears to be still increasing. Some special effort must have been made last year to bring grist to the mill; for the revenue from electricity supply was raised to £17,137. The screw was at the same time applied strenuously to the costs, with the result that the expenditure on revenue account was kept down to £8389, so as to permit of a gross profit being exhibited, of £10,067. Out of this, interest and sinking fund called for £9470; thus leaving an apparent "surplus" of £597 for the year, as compared with the previous year's deficit of £3497. How much respect is due to such a quick change as this remains to be seen in future years. At any rate, the accounts do not say much for the undertaking, after all these years. One would hesitate to state a figure for what might be properly deemed the maintainable profit on the undertaking. If this is about £500, which seems a generous estimate, it would obviously require upwards of 300 years' purchase to cover the capital outlay.

It is distinctly amusing to peruse the usual comments of the electrical journals on the accounts which they are continually publishing of electricity supply undertakings throughout the country. It is rarely that these statements receive any other

qualification than "very satisfactory," or "distinctly favourable." These encouraging remarks usually refer to some microscopic reduction of the fuel costs, or other small matter—highly creditable, doubtless, to the much-harried engineer in charge, but not very material to the finances of the undertaking as a whole. There is a patronizing gentleman who looks after the published accounts of these concerns in a contemporary, and this is how he pats one painstaking station manager on the back: "The costs already have been brought down to a particularly favourable level; and although I do not suggest that the engineer should be content to rest on his laurels, I shall be quite satisfied if that level be maintained during the current year." The engineer in question must feel obliged to the gentleman, and be happy in trying to give him continued satisfaction. All the same, these conventional comments do not really touch the spot. It is never hinted that any electricity supply undertaking is a failure, though the accounts betray the disappointing truth in five instances out of every six, if not in a larger proportion.

The state of the electrical engineering trades in Germany is a subject that must possess great interest for English dealers in electrical goods. It has been generally recognized that German manufacturers went ahead too fast and too far in the last years of the past century, and that the industrial interests of that country are still suffering from the inevitable reaction. It is difficult, however, for outsiders to realize precisely what the situation really means to those who are actually concerned in it. Herr Isidor Löwe has undertaken to make a comprehensive display of the facts at this year's meeting in Hamburg of the German Sociological Association, and his account is a very striking story of rash speculation. An electrical fever took hold of Germany during the years 1895-1900, and electric light works sprang up everywhere. The number of these establishments increased from 180 to 774, while all sorts of manufactories turned over to electric power, and electric tramways were made everywhere. The producers of electric plant acted as though the demand would be lasting, and increased their capital obligations beyond measure. Then came the discovery that there were no more towns to be supplied with electric light works, and that electric tramways had been overdone. Most of the sudden industrial expansion was based upon paper. Very few of the shares of the electric light and traction companies had been taken by the public; and practically the only cash payments were those of municipalities and a few independent firms who had adopted electricity on its merits. "It was found that large sums were locked up in unremunerative plant, and that the portfolios of the companies producing electrical machinery were full of electric tramway shares which had been taken in payment for work." Extravagantly large and costly electric power works, such as the one built by the Germans in the Russian petroleum field, were found to be white elephants. The effects of all this rash speculation remain, and the end of them is not yet. Herr Löwe is not at all sanguine as to the immediate future of electric industries of any kind. There is very little real demand for new power stations or tramways, and what there is does not go to Germany. The chief source of employment for the electrical engineering firms for some time yet to come, Herr Löwe thinks, will consist in the replacement of worn-out machinery. As for any immediate or thorough recovery of prosperity in this line, in can only come through some new departure in applied electricity, of which there is no present indication. This is a pretty picture of the condition and prospects of the lighting and power industries "of the future." The future seems to have already faded into the past, at any rate so far as the German trade is concerned.

## THE SAD CASE OF MR. JOHN WILSON.

SOMETHING like a field-day upon gas matters was engaged in by the Corporation of Glasgow at their meeting last Thursday. Matters of great moment occupied the attention of the councillors—some of them of a pleasant nature, but one at least of a description which might, perhaps, be left unnoticed, were it not for the circumstance that, in this world, the most powerful lessons in the way of duty are derived from the records of disaster.

It is with every feeling of sympathy with Mr. John Wilson, of Tradeston, and regret that his connection with the Corporation should be severed in so untoward a manner, that we discuss the subject. He was charged at the instance of a town councillor, who was at one time District Secretary of the Gas Workers and General Labourers' Union, with certain irregularities in the conduct of the Tradeston Gas-Works. A Committee of the Corporation held an inquiry into the charges, which, from its protracted nature, must have been both thorough and careful; and, in the end, they reported that—chiefly by Mr. Wilson's own admission, but partly on account of his conduct after the inquiry was begun—they found him guilty of irregularities. It must be confessed that they were of a trifling character; and, had they stood alone, it is almost certain that the Corporation would have overlooked them. It may be there are a few works the managers of which, almost as a matter of course, obtain privileges at the expense of their employers—such as a few hours' work from an otherwise idle workman, or an article, worthless in the works, sent to his home—which, if a workman were to emulate, would be treated as not permissible. This was about all that Mr. Wilson is found by the Committee to have done. But the Corporation of Glasgow did not treat the matter as slight; and they were, of course, within their right, for in this connection it is no justification for a thing which is unclean to say it is not uncommon.

Mr. Wilson was tried on his merits—more than that, the trial upon the charges which the Committee found substantiated might have been obviated if he had made a frank admission and expressed regret. He chose, however, while admitting the facts, to maintain that he had purified the transactions financially. It is just there that his greatest failure came in; for the Committee found that the payments having been ante-dated suggested that the refunding of the money was an afterthought, and that but for the fear of the inquiry the repayment would not have been made. With this in their minds, the Committee could not have done otherwise than recommend that Mr. Wilson should be dealt with by the Corporation; and it is difficult to differ from the view—stern as it is—which the Corporation took of the matter. The truth is, however, that Mr. Wilson has been condemned, not by what his accusers brought forward, but by himself. The witnesses against him were his own men. Their evidence was of the most flimsy character, such as would not have swayed very much a legal mind, for which, however, it must be admitted that the method of presentation of it would have counted for much. But if the weight of the evidence was not such as to lead to the establishment of blameworthiness, it was the evidence (such as it was) which brought Mr. Wilson to bay, and led him into the mire.

Then there arises a reflection which is of wider interest than the doings at Tradeston. Gas workers with a grievance against their manager are universal. Few workmen have the courage to prefer a charge against their manager, and even if they had, their chances of success would be so slight that none would venture. But with a skilled organizer of labour at hand it is different. Let the man with a grievance but relate it to him, and, so far from there being fear on his part to take the matter up, it will be the very breath of his nostrils to have the opportunity to vindicate the cause of a down-trodden workman. In his hands, no stone will be left unturned to bring forward incidents which may tell against the manager, even though they may be six or eight years old, as in the case of Mr. Wilson; and what is lacking in weakness may be made up for by audacity.

Mr. Wilson is the first who has fallen in this way; but may the same tactics not be repeated elsewhere? It is not a cheering prospect, this. If it were possible to conceive such a combination of circumstances as were here in the Glasgow case, managers would live with a mine underneath them, which might go off at any moment, and their existence would be miserable. That there will be trouble of a similar kind elsewhere is not unlikely. The safeguard against it will be chiefly in a life of rectitude; but it will be found also in the good sense of members of corporations. When the honour of the corporation is not affected, they are not very likely to turn against a manager who is doing his duty. But what will be the fate of one against whom a section of the corporation have a grudge? Does not Mr. Wilson's case throw a lurid light upon his footpath? With foes at the council board, and foes, reinforced from without, in the works, it will be no easy matter for him to keep on his feet. In this, there is to be found a new form of annoyance to the already sorely-troubled manager. Whether it were intended or not, by the promoters of the case against Mr. Wilson, this Tradeston matter has a close bearing upon the relation existing between employers and organizations of labour. That is borne out clearly by the evidence given by one of the stokers during the inquiry. The man had been taken from the retort-bench in March, and put to do work in the yard. This he regarded as victimization, and when asked if the Manager could not have dismissed him, he replied that he could not, because he was signed up to the 8th of August. This policy of signing on for a fixed period was adopted in Glasgow after the strike at the end of 1899. It was intended to prevent masses of men leaving their work at one time. The practice has served its purpose hitherto; but here is an instance of its application the other way. A discontented man cannot be dismissed. Until his engagement comes to an end, he must be kept on—an influence not on the side of good order in the works—and in the end he may be brought forward to swell the body of testimony which may be piled up against the manager.

Looked at in the view of the forces in the case being the old ones of Capital and Labour—and it is impossible to shut this view out—it has resulted in a triumph for the labour cause. It is herein that the significance of the case lies. As we have shown, there are several useful lessons in it, of which it will be well not to lose sight.

**Manchester and District Junior Gas Association.**—The next meeting of the Association will be held on Saturday afternoon, in the Municipal School of Technology, Manchester, when a paper will be read by Mr. Harold Smith, of the Bury Corporation Gas-Works, on "Tar Distillation." The "Gas Engineering" class which has been arranged by the Association will be held in the above-named school on Friday evenings, from 7.25 p.m. to 9.30 p.m.; the teacher being Mr. F. Russell Hartley, Assistant-Engineer of the Salford Corporation Gas-Works. The course will consist of about thirty lectures; and the first will be given on the 2nd prox.

## THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see page 758.)

We have again to record a week of idleness upon the Stock Exchange; nor is there any sign of improving business. The payment of the instalment due on the Transvaal Loan was met with much greater ease than was anticipated, and did not disturb prices; but the general trend is to lower levels. Consols have again given way to 88$\frac{13}{16}$ for cash, and 88$\frac{7}{8}$ for the account; thus establishing fresh records since 1870. The dulness is partly attributed to the Ministerial crisis, though it is more probably the effect of the firmness of the Money Market, and the closing of old speculative accounts for the rise. Other gilt-edged stocks have given way—including Indian sterling loans and Colonial Government stocks. The Gas Market has also suffered with the general stagnation; for with the exception of Gaslight ordinary, which has been fairly active, the dealings were very moderate. Prices, however, have been well maintained all along the line. Gaslight ordinary is quoted 85-87; but the 4 per cent. preferred is better at 103-105. There was a little business in South Metropolitan between 119 and 120$\frac{1}{2}$; but the price has remained unaltered. In the Suburban and Provincial group, Newcastle debenture stock is higher at 100-102; while the Sheffield stocks are quoted *ex div.* Alliance and Dublin improved $\frac{1}{2}$, to 19-20. The Foreign group was also very quiet; and prices continue unaltered. The San Paulo Company have announced the declaration of an interim dividend at the rate of 6 per cent. per annum in respect to the half year ended June 30. Business has been done in the shares at 11$\frac{1}{2}$ and 11$\frac{3}{4}$. Hong Kong were dealt in at 15$\frac{7}{8}$ and 16, and Monte Video gas at 9$\frac{1}{2}$. As regards Water stocks, there is only one change—namely, a fall of 3 in West Middlesex, to 270-275. This market has been extremely idle; very little business being officially recorded.

The daily operations were: A quiet day on Monday in Gas, without any change in value. Water stocks were also quiet. West Middlesex fell 3 to 270-275. Quietness again prevailed on Tuesday, though Gaslight ordinary was rather active between 86 and 86$\frac{3}{4}$; while the preference stock rose to 103-106. Water stocks were again unaltered. Wednesday was similar to the two preceding days; no changes being recorded in either Gas or Water stocks. On Thursday, business was done in Gaslight ordinary between 85$\frac{1}{2}$ and 86$\frac{1}{4}$; the price remaining unaltered. Business was done in South Metropolitan at 119. The only change on Friday was a rise of $\frac{1}{2}$ in Alliance and Dublin. Saturday was a holiday on the Stock Exchange.

## OBITUARY.

### THOMAS FLETCHER.

It is our painful duty to record the death on Sunday night of Mr. Thomas Fletcher, F.C.S., the Chairman of Messrs. Fletcher, Russell, and Co., Limited. Our readers may possibly remember that Mr. Fletcher had been confined to his house for some time; but though the state of his health was such as to preclude the hope of ultimate recovery, his death came at last somewhat suddenly.

Mr. Fletcher ,whose name has for something like thirty years been before the gas world as a maker of appliances for the utilization of gas for industrial and domestic purposes, was originally engaged in the profession of dentistry; but he was led to turn his attention to the production of apparatus more closely connected with the preparation of food for the consumer than with its mastication when so prepared. As a consequence, he introduced at his works at Warrington the special branch of manufacture which has gained for him and them a world-wide reputation. At that time the gas-stove was not so generally employed as it is now; and so there was a large field for the cultivation of the new industry. The business, originally established in January, 1872, grew to such an extent that in its conduct Mr. Fletcher was subsequently joined by Mr. Alfred Clare as a partner. Later on, that of Messrs. W. & A. C. Russell and Co., founded at Pendleton in 1876, and working on much the same lines as Mr. Fletcher's, was amalgamated; and on April 1, 1881, Mr. Alexander Neil became a partner. A Company was formed and incorporated on the 16th of February, 1892, to purchase the united concerns—Mr. Fletcher being the Chairman and Mr. Neil the Vice-Chairman. The constantly increasing demands upon the works led to the carrying out of an extension scheme in accordance with designs prepared by Mr. Neil. The object was to centralize the workshops and the administration of the business, to provide more accommodation for improved plant, to save carriage and trading expenses between departmental works, and to prepare for general economies to meet growing competition. On the new works being brought into use in 1899, the establishment in Thynne Street, Warrington, was abandoned. The progress of the Company in their new abode has been steady.

Mr. Fletcher was not only a designer and maker of gas appliances, but a capable advocate of their value in the household and the factory, as his contributions to the "Journal" and other publications abundantly testify. Even though confined to his house, he wrote several articles and letters which have appeared within the past few months. Early in 1880, he read before the Society of Arts a paper on "The Use of Gaseous Fuel, with Special Reference to its Application to Laboratory Furnaces." In the course of that paper he expressed the opinion that the time was not very far distant when gas would be used exclusively for cooking purposes, and that its rapid adoption all over the wide world depended only upon the makers of the apparatus. He said that if these people had to pay for all the gas wasted in their appliances, he thought many improvements would quickly be made. This paper was followed in 1883 by one read before the Gas Institute, entitled "High-Power Burners for Heating by Gas, with Suggestions for Increasing the Day and Summer Consumption;" and three years later by one on "A New Departure in Water Heating." Mr. Fletcher was the author of a little book on "Coal Gas as a Fuel," which was intended as a concise guide to fitters and users of gas; and as a supplement to it he published "Commercial Uses of Coal Gas." A book by him on "Practical Dental Metallurgy" reached a third edition. For the great service he had rendered to the gas industry he was included among the honorary members elected by the Institution of Gas Engineers at their meeting last June.

Though, as already remarked, Mr. Fletcher had been confined to his house, he took a keen interest in the business of his Company, the chairmanship of which he held till the last.

## PERSONAL.

Last Tuesday, at the Friends' Meeting House, Park Lane, Croydon, Mr. J. A. Ransome (who is a joint Managing-Director with Mr. H. M. Thornton, of the Richmond Gas Stove and Meter Company, Limited) was married to Miss Helen Morland, daughter of Mr. C. C. Morland, J.P. There was a large gathering of friends afterwards at the reception, which was held at "Rastrick," Morland Road, Croydon, the house of the bride's father. The presents to both bride and bridegroom were numerous and costly; that of the Directors, officials, and employees of the Company being a handsome Bechstein piano and an Angelus.

In the report presented at the recent meeting of the West Kent Gas Company, the Directors announced with regret the retirement, owing to advancing years, of Mr. George Anderson from the chairmanship, which he had filled for eleven years. They have elected Mr. J. J. F. Stevens as his successor, and Mr. C. Beadle, J.P., as Vice-Chairman; while Mr. James Blackford, one of the Directors of the Mitcham and Wimbledon Gas Company, will fill the vacancy on the Board. Mr. Anderson has also relinquished the important positions he held for many years in Ireland, and is succeeded by his son, Mr. R. Bruce Anderson.

As intimated in last week's "Journal," Mr. George Keillor, jun., of Peterhead, has been appointed Manager of the Broughty Ferry Gas-Works. Mr. Keillor, who is twenty-nine years of age, is a son of Mr. George Keillor, the Manager of the Nairn Gas Company, Limited. He served under his father for three years, and then for about five years was Assistant to Mr. W. Ewing, at Hamilton. In 1899, he received the appointment at Peterhead; and since then the gas consumption has risen from 19 to 31 million cubic feet. At the sitting of the Town Council on Friday, Mr. Keillor's resignation was accepted. Reference was made to the excellent work done by him during the four years he had been with the Council; and it was decided to place upon the minutes a record of their high appreciation of his services.

Mr. A. T. Cowper-Smith, whose name has been mentioned in our columns in connection with his successes at the City and Guilds of London Institute's examinations in "Gas Manufacture" has been appointed Assistant-Manager (under Mr. James Paterson) of the Redhill Gas-Works, in succession to Mr. J. Wesley Whimster, who, as already announced in the "Journal," was selected to fill the position of Assistant to Mr. S. Y. Shoubridge, at the Crystal Palace District Gas-Works, vacated by Mr. Robert English. Mr. Cowper-Smith was a student of gas manufacture at the Regent Street Polytechnic, under Mr. Walter Grafton; and he passed highest in the Ordinary Grade, at the City and Guilds of London Institute, in 1897, and highest in the Honours Grade the following year. We cordially wish him continued success in the career he has chosen.

Mr. A. G. Glasgow (of Messrs. Humphreys and Glasgow) is paying a visit to America. He sails on the 2nd prox. in the *Celtic;* and it is expected, unless urgent business at the London office recalls him, that his stay "on the other side" will be of several months' duration. The object of his visit is purely a business one—to enable him to get abreast of the work of the firm's New York office, and to bring himself up to date, by direct association, with what is passing generally in the gas industry in America, and particularly with the latest experiences and improvement in water-gas plant and manufacture there. As he says, "there is much that is useful to be learnt by the gas man in America, just as there is in this country; and the best way to learn it is to be in the midst of it." Mr. Glasgow's large circle of friends in the industry on this side will be glad to know that his absence, though to be somewhat prolonged, is only to be a temporary one. Though absent, he will not be forgotten—by many.

# TECHNICAL RECORD.

## EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.

Fine weather, a town of unusual attraction, and a President who had a claim upon the members in return for years of devoted labour for the Association in the office of Hon. Secretary all contributed to the large meeting of the members in Newmarket last Wednesday. The new President is Mr. J. H. TROUGHTON, who, as is well known, is the Engineer and Secretary of the local Gas Company.

The events of the day opened by the entertainment of the visitors at luncheon, on the invitation of the Chairman and Directors of the Company. The whole of the members of the Board were at the head of the table—viz., the Chairman (Alderman Stephenson, J.P.), and Messrs. Charles Diver, Samuel Westley, Thomas Jennings, and C. B. Bosworth—and throughout the day they personally did their utmost towards making it a complete success. Near to the Chairman at the luncheon and a participant in the subsequent proceedings, was the President of the Institution of Gas Engineers (Mr. H. E. Jones). The luncheon was much enjoyed; and at its conclusion the retiring President (Mr. E. W. Smith, of Chelmsford) invited the members, in a formal resolution, to record their great appreciation of the kind and generous reception they had received at the hands of their hosts. The motion was seconded by Mr. John S. Dougall (Boston), and was carried with great heartiness. The Chairman, in a neatly expressed response, took the opportunity of stating the pleasure which he and his colleagues derived from welcoming the members to Newmarket; and he made full recognition of the good work the Association are doing.

The Business Meeting was subsequently held in the Rothsay Rooms; and at the commencement the retiring President, Mr. E. W. SMITH (Chelmsford), was in the chair.

The HON. SECRETARY (Mr. T. A. Guyatt, of Ely) first read the minutes of the last meeting, held at King's Lynn; and these were confirmed, on the motion of the CHAIRMAN, seconded by Mr. J. G. HAWKINS (Wisbech).

### ADDITIONS TO THE ROLL.

On the proposition of Mr. CASTERTON (Melton Mowbray), seconded by Mr. CROXALL (Witham), Mr. H. Rowley Wimhurst, of Spalding, was elected a member, and Mr. H. M. Thornton, of Stratford, an associate member of the Association.

### THE NEW AND RETIRING PRESIDENTS.

The CHAIRMAN said the next item was the induction of the new President; and he had great pleasure in undertaking this duty. He should, however, like to express his own grateful thanks for the assistance he had received from one and all of the members of the Association during the year he had filled the position of President. He entered upon his term of office with considerable misgivings; but he might say that the work had been rendered very light, and as pleasant as possible, by the assistance the members had accorded him. He heartily thanked them all for this help. In introducing the new President, he did not think he need say much, as Mr. Troughton was well known to them all. He served a long apprenticeship as Honorary Secretary of the Association; and if any member was qualified to discharge the duties of President, he thought it was their friend Mr. Troughton. He (the Chairman) knew that his appointment was a very popular one. He had the interests of the Association greatly at heart; and he (the Chairman) believed he would carry on its work creditably during the time he would fill the presidential chair. On behalf of the Association generally, he had great pleasure in asking Mr. Troughton to preside over their deliberations for the ensuing twelve months.

The PRESIDENT, on taking the chair, met with a very hearty reception. He remarked that it was customary for the new President to propose a vote of thanks to his predecessor in office. Mr. Smith, however, had been a little premature in returning thanks to the members before the vote was passed. Nevertheless he (the President) had much pleasure in asking the members to give him their very hearty thanks for the excellent way in which he had conducted the affairs of the Association. They were aware that the Association had prospered under his presidency. They knew how hardworking he had been; and he (the President) was sure Mr. Smith would remember his term of office for many years to come. Their prosperity during the past year was due in a very large measure to Mr. Smith's tact and business qualities in the chair.

Without being seconded, the motion was enthusiastically carried.

Mr. SMITH said he was much obliged to the members for this vote of thanks. He had felt all along, with great misgiving, that the mantle which had been worn so well by his predecessors had perhaps not been worn so well by himself; and he had always had the feeling that his successors would be able to carry on the work of the Association much better than he had been able to do, though he had had its interests very much at heart indeed. He thanked the members heartily for the vote.

The PRESIDENT next delivered his

### INAUGURAL ADDRESS.

Gentlemen,—It is with pleasure that I rise to address the members of this Association, with whom I have been so closely connected during the past eight years as Honorary Secretary and Treasurer; and I sincerely thank you for electing me to occupy the presidential chair. I am deeply sensible of the honour you have conferred upon me; while I am none the less conscious of the responsibility which attaches to the position of President of such an important Association as this. But I feel sure I may count upon having such support and help from you, individually and collectively, during my year of office, as will enable me at its close to hand over to my successor the care of the Association not less flourishing and prosperous than it is to-day.

It is now my privilege to offer you all a hearty welcome to Newmarket, which I need not tell you is famed throughout the world as the Metropolis of the Turf, and sometimes described as the little town in Cambridgeshire, which designation, however, is hardly correct, as the town is rapidly expanding, and becoming well known as a health resort. I hope your visit will be profitable and pleasurable.

It is not my intention to give you a long history of the local gas supply; but I would like to say that the gas-works here were erected in 1837 by John Malam, a gentleman who, with his brother or son, George, about this time erected and owned many small works in the Eastern Counties—among others, those at Ely, Sudbury, and Wisbech. The Company started operations with the modest capital of £3000, and from the first lighted the streets. In 1843, the works were let on lease to Messrs. J. Bacon and Son, who forthwith issued the following terms on which they would supply gas for private lighting.

NEWMARKET VICTORIA GASLIGHT WORKS.

J. BACON AND SON

Respectfully inform the gentry, tradesmen, and inhabitants of Newmarket that they have taken the above works and will supply gas by meters at 12s. 6d. per 1000 cubic feet, and also contract for supplying 12-hole argand or batswing burners for six nights in the week:—

| | Per Year. | Summer Quarter. | Winter Quarter. |
|---|---|---|---|
| From dusk till 9 o'clock . . . | £3 2 0 | £1 3 6 | 7s. 6d. |
| ,, 10 ,, . . . | 3 11 6 | 1 6 6 | 9 3 |
| ,, 11 ,, . . . | 4 0 0 | 1 9 6 | 10 6 |

If used on Sundays, one-sixth more will be charged. Payments for gas to become due and payable on the 6th of January, the 6th of April, the 6th of July, and the 11th of October in every year; and on no account will any person be supplied with gas otherwise than at the above prices.

Good coal tar sold on the works at 4d. per gallon.

Coke made from good coal at 22s. per chaldron, or 8d. per bushel. Large quantities sold by contract.*

Gas fittings supplied at cost prices and fixed on reasonable terms.

*Regulations to be Observed by the Consumers of Gas.*

Persons wishing to take gas will, on application at the works, receive every information respecting the mode of fitting up, &c.

The service-pipe will be laid to the front walls of the houses in the public streets. The interior and all other fitting up to be at the expense of the consumer, and to be made perfectly air-tight, subject to the approbation and future inspection of Messrs. J. Bacon and Son.

Argand burners must not be used without glasses, nor the flame of any description of burner exceed 5 inches in height. When this is not attended to, the brilliancy of the light is diminished and rendered unpleasant.

The lights are to be extinguished within a quarter-of-an-hour of the time contracted for, except on Saturdays, when they will be allowed to burn till eleven o'clock.

Every reasonable indulgence will be granted; but, in justice to the concern, it is expected the above regulations will be punctually attended to. Otherwise, the supply of gas will be discontinued.

July 20, 1843. J. BACON AND SON.

The above advertisement was issued on a neat little card. I have no doubt that the lessees were enabled to pay a fair rent for the concern, as it is recorded that the Directors resolved to spend the sum of 30s. at the White Hart Hotel for refreshment on the occasion of receiving the rent from Messrs. Bacon. This arrangement continued for some seven years, when the lease ran out, and was not renewed. The capital was increased from time to time as the business grew, the Company experiencing various ups and downs, but always being fairly prosperous. Coal was brought to Burwell (five miles away) by water, until the railway was extended here, about 1850, when the station was erected a mile away from the gas-works.

The following will show how the Company's business has increased:—

| Date. | Make of Gas. | Capital. | Price per 1000 Cubic Feet. |
|---|---|---|---|
| 1840 . . . . | 750,000 .. | £3,000 .. | 12s. 6d. |
| 1875 . . . . | 10,241,000 .. | 8,432 .. | 6s. 8d. and 5s. 10d. |
| 1885 . . . . | 28,000,000 .. | 18,760 .. | 5s. and 4s. 6d. |
| 1895 . . . . | 49,000,000 .. | 30,000 .. | 4s. 8d. and 4s. 2d. |
| 1902 . . . . | 54,823,000 .. | 65,000 .. | 3s. 8d. and 3s. 4d. |

In 1895, the Company obtained a Special Act, under which the £30,000 capital was consolidated into £60,000 5 per cent. stock. The remaining £5000 represents a loan. By adopting the sliding-scale, the Company have been able to reduce the price of gas under it, since 1895, from 4s. 8d. to 3s. 8d., and to divide 6½ per

* At this time the Company consumed 100 tons of coal per annum.

cent. on the consolidated stock, which is an exemplification of the fact that the sliding-scale, directly it is brought into operation, makes consumers of gas co-partners with the proprietors of gas undertakings, which they seem to overlook unless it is frequently and pointedly brought before them. Even then I venture to say that scarcely one consumer in twenty appreciates the financial interest they all have in the undertaking supplying them with gas. If they did so, many would hesitate before going in for other modes of illumination. It is indeed strange that the average gas consumer seldom knows that the sliding-scale provides that, whether by increased sales of gas, cheap coal and materials, modern improvements in manufacture or good management, enabling increased profits to be earned, three-fourths and upwards goes directly to the consumers in the form of a reduced gas bill. Parliament has thus made the users themselves large participators in this splendid system of profit-sharing. I know some engineers argue that the system is too much in favour of the gas consumer; but my opinion is that if it is properly administered—if the undertaking working under it does not starve its works and plant, but, on the other hand, keeps them in a good state of efficiency—then it is an investment to every consumer of gas which will afford him as much relief to his pocket as any form of municipal trading is likely to do.

Municipal trading is, at the present time, a very vexed question, owing to the expenditure of vast capital by municipalities upon what is considered purely speculative business, to the detriment of private enterprise; and this competition has naturally aroused the indignation of a large class of the community. I believe it has seriously affected many industries outside our own, especially the small trader, who not infrequently finds that the municipality to whom he has paid high rates, have, by outrageous mortgaging and pawning the security of the rates to swell an ever-increasing loan account, embarked upon speculative businesses to their own embarrassment, direct loss to the ratepayers, and ruin to some. This form of trading by municipalities has in many towns affected our own industry, where rate-aided electrical installations have been allowed to run riot without the least regard to capital expenditure. Where this gambling with the ratepayers' money has resulted in direct loss to the municipality, it is sorry comfort to find that we, as ratepayers, have to wipe off the deficiency in addition to having our own particular business adversely affected. The public, however, are awakening to the fact that municipal trading can be carried too far; and the Industrial Freedom League has recently been formed, with Lord Avebury as its President, the object of the Association being to free private enterprise from rate-aided competition. The Bermondsey clause is likely to have a far-reaching effect upon municipal trading; and every company, especially the small ones, should take care that this safeguard to their interests should be inserted in all Electric Lighting Acts or Provisional Orders of local authorities.

The report of the Joint Select Committee of the House of Lords and the House of Commons, appointed to consider this matter, has been published as a parliamentary paper. While the Committee make little comment on the merits or demerits of the system, they do make some strong recommendations on the system of municipal account keeping and auditing, which, if adopted, will have the effect of providing more explicit information to ratepayers as to the profit and loss of the various ventures they provide the capital for. It is to be hoped the Committee will be re-appointed in the next session to continue their investigations on this important subject, and be enabled to make such further suggestions as will eventually lead to legislation fixing such restrictions on rate-aided competition as will not unreasonably prevent legitimate business being carried out by local authorities, but which will safeguard the trading community from the palpable injustice of unremunerative and unfair competition in any business carried on with ratepayers' funds.

The millions of loan capital which some of our so-called up-to-date municipalities have piled up for posterity to repay is astounding, and especially in regard to the extravagant manner some of their electrical undertakings have been bolstered and patched up, until they have become sickly weaklings, unable to stand alone. Glasgow is a recent case in point, where the Electricity Department shows a deficit of £13,895 on the past year's trading, which has been calmly transferred for the Gas Department to pay. This is how municipal trading affects the gas industry; and I maintain that it is neither reasonable nor fair. Where there is the least shadow of a doubt as to whether such an undertaking will be remunerative, it should most decidedly be left to private enterprise; and those of you who have experienced it will agree with me that retribution must assuredly come to the owners of undertakings which are wilfully or ignorantly over-capitalized, whether rate-aided or otherwise.

The reduction of the statutory illuminating power of gas to a lower limit, which Parliament has sanctioned recently, is undoubtedly a step in the right direction towards enabling gas undertakings to give their consumers the advantage of gas more suited to modern requirements, which must tend to the greater utilization of the incandescent burner and the more extensive use of gas for motive power, heating, and cooking, for which purposes the lower-grade gas is just as suitable, inasmuch as it can be sold at a price in proportion to the standard it is reduced to. How far this substitution of low-grade for high-grade gas will go, time alone will tell; but it is a significant sign that in the near future it will become more general when we find municipalities eager to bring about a reduction of illuminating power who a very short time ago were quite as eager to screw up the statutory illuminating standard to the highest possible pitch. When we think of the fights there have been on the historic battlefield of Westminster for the matter of half-a-candle, how strange it seems to-day that many of those who fought strenuously for high illuminating power are being convinced that the lower-grade gas is really the most serviceable for present-day requirements.

The sulphur clauses which some of our members find a hardship, and a hindrance to economy of working, seem likely to have the strong light of the legislature shed upon them in the near future; and although much has been said, and much will be said, for and against the retention of them, it is aggravating to those who have had the restrictions placed upon them to find the imposition so hard to remove. The laws of our country are slowly made; and it is a herculean task to get them amended or repealed. I am of opinion, however, that the time has come for the sulphur clauses to be abolished; and it will be interesting to watch the course of events in the near future in connection with the Crystal Palace District Gas Company's second application for their repeal. It seems to me that Parliament must always have had some idea that the imposition of the sulphur clauses was not likely to be so beneficial to the public as their advocates believed they would be; otherwise, more than one undertaking in fourteen (which is the average) would have been placed under the restriction.

Some of us are smarting under the excessively high rates or freights which we have to pay the railway companies for the conveyance of our coal and merchandise—rates which are out of all proportion when compared with those of some of our near neighbours. Newmarket is a case in point, where the rate for the conveyance of gas coal is one of the highest in the Eastern Counties when compared with the mileage. I recently had occasion to look carefully into this matter, and think if I give you the result of my investigations it may be useful to some who are similarly situated. The rates and mileage are those from a colliery near Barnsley (from which we draw our gas coal) to fourteen towns in the Eastern Counties.

| Town. | Distances from Colliery. Miles. | Chains. | Rate per Ton in Trucks. s. | d. | Rate per Ton per Mile. Pence. |
|---|---|---|---|---|---|
| Newmarket | 139 | 78 | 8 | 5 | 0·7214 |
| Cambridge | 134 | 33 | 7 | 5 | 0·6617 |
| Bury St. Edmunds | 151 | 4 | 8 | 10 | 0·7019 |
| Ely | 126 | 50 | 7 | 1 | 0·6719 |
| Colchester | 185 | 35 | 7 | 10 | 0·5070 |
| Maldon | 189 | 13 | 7 | 10 | 0·4973 |
| Long Melford | 165 | 52 | 9 | 4 | 0·6767 |
| Haverhill | 152 | 12 | 9 | 1 | 0·7171 |
| Mildenhall | 141 | 75 | 8 | 6 | 0·7183 |
| Brampton | 201 | 52 | 9 | 1 | 0·5396 |
| Norwich | 170 | 23 | 8 | 1 | 0·5706 |
| Wymondham | 167 | 25 | 9 | 3 | 0·6646 |
| Thetford | 147 | 2 | 8 | 5 | 0·6871 |
| Braintree | 177 | 63 | 9 | 0 | 0·6067 |

If Newmarket were charged on the mileage basis of our nearest neighbours, Ely and Cambridge, the rate would be 7s. 9d.; but if on the average mileage to Colchester and Maldon, our rate should be 5s. 10d. It is obvious, therefore, that if the railway company can carry coal to Maldon, 189 miles 13 chains, for 7s. 10d. at a profit, it shows they are reaping a rich harvest from Newmarket, a distance of only 139 miles and 78 chains, for 8s. 5d. Of course, water carriage and railway competition account to some extent for the difference, but not sufficiently to convince me that we have an equitable rate for our coal and merchandize. At present we are powerless, owing to being on a branch line of the Great Eastern Railway, with no competition by rail or water. Thus we are handicapped, and, unfortunately, not alone, as I know of other places in the district covered by this Association who are suffering from tariffs insisted upon by the railway companies' "might," not their "right," the inconsistency of which, to be put upon a fair and equitable basis, requires united action by this and kindred associations.

Another grievance members of this Association suffer at the hands of the Great Eastern Railway is that they refuse to convey gas coke in their waggons, thereby preventing us from either buying or selling coke, should we have an opportunity. There appears to be no difficulty in getting coke in Midland or Great Northern waggons into this district, and why the Great Eastern should refuse to lend theirs for coke traffic, as they have done repeatedly during the summer, when their sidings have been full of idle waggons, is a mystery. I am not sure whether they are within their rights as common carriers in refusing this traffic. This is a matter which concerns the whole of the Association, having regard to our coke trade. Some members of the Association have purchased their own coal-waggons, which, of course, can be utilized for the conveyance of coke when needed; but small or medium-sized works, who cannot keep waggons constantly employed, would probably find an investment in waggons unprofitable.

It may be of some interest to you to know that the Great Eastern Railway are issuing specifications to private or prospective owners for building 15, 20, and 30 ton waggons; but whether they will be able to reduce the rate per ton when conveyed in the larger-sized waggons, in consequence of cheaper haulage, I am unable to say.

The gas industry is now, happily, once again represented by a re-united national organization; and since we last met the first meeting of the new Institution of Gas Engineers has been held, under the presidency of Mr. Andrew Dougall, whose inspiring address and ideal suggestions will long be memorable as marking the commencement of a new era of prosperity, concord, and goodwill among the profession, which has not, unfortunately, existed in the past. I am sure this will be for the common good and welfare of all connected with what may be termed one of Britain's greatest industries. This Association has, since its inception, taken great interest in, and some share of the work of, bringing about the unity which now exists; and we are no less interested, but anxious, to see its usefulness extended in the future.

I dare say you will expect me to say something bearing upon Mr. Dougall's suggestions; and without going too deeply into detail, I will mention a few thoughts or ideas on some of them. Affiliation of the District Associations with the parent Institution is worthy of our consideration, having regard to how it will affect those of our members who are not members of the Institution, and in order that Local Sections may be formed, working from, and always in touch with, the central organization. In an Association such as this, covering a very large area and containing many representatives from comparatively small towns, it is doubtful whether all the members will ever be members of the Institution, which is, I think, a strong reason in favour of federation. I do not see any reason for altering the existing basis of electing the Council, which gives fairly equal representation. It might be strengthened, however, if, in addition, Presidents of the District Associations were allowed to become *ex officio* members of the Council, and sent up by the local centres to have an equal vote with the elected members, in the same way as aldermen on county councils, but only for so long as their term of office extends. If the President of a District Association happened to be a non-member of the Institution, he might be considered as disfranchized; and his Association would lose representation for the time being. There will be many points of detail to arrange before anything definite is done in this matter; and without going into the *pros* and *cons*, I may remind you that the Council of the Institution is empowered to appoint a Sub-Committee to deal with this subject, and with Mr. Dougall's other suggestions.

The centralization of all organizations having for their object kindred branches connected with the industry is desirable, and the Gas Companies Protection Association is one for special mention. It has done good and useful service so far as it has been able; but it has not received the financial support it deserves, and has only a limited membership. If it were affiliated, it would command more support, do more effective work, and perhaps be more economically administered. (When I say this, I do not imply that it has not been well administered). There should be no difficulty in obtaining the requisite funds for carrying on the special work pertaining to each branch; and I think the *pro rata* system of subscription might be adopted, on the lines of the Sulphate of Ammonia Association, which is based upon the production.

We need an experimental gas-works for the profession, and a laboratory where research work can be fostered and furthered, scientific and mechanical inventions tested and proved, and chemical mysteries solved and made clear, all of which should be provided for, so far as funds are concerned, by subscriptions from the gas undertakings. They can well afford to do it, for they never were so wealthy or prosperous as they are to-day; and it is equally true that there never was a time in the history of the gas industry where it was more needful or necessary for those who have to control or conduct gas undertakings to be well trained and equipped in the scientific, technical, chemical, and commercial branches of our business.

That excellent piece of advice given to the country by the Prince of Wales on his return from his tour round the world, that we should "wake up," would seem not to have been spoken altogether in vain; for the fact that we are being outpaced by other nations in the race for commercial supremacy is being driven hard home to the minds of our merchant princes and statesmen, and the subject of the higher education and training of the people is having the attention of the legislature and county councils turned to it, who are placing such facilities within the grasp of the studious youth and manhood of the country as will enable them to arrest the too apparent decline experienced in British trade.

The munificent proposal which Lord Rosebery was recently privileged to make to London, of a new Technological College, will be a most useful national institution, if it can be established, for the advancement of our aspiring and cultured students, especially those who, at the end of a distinguished career at our technical schools, find themselves without the facilities for continuing their studies in the highest branches of technological and scientific research. It is just here that the gas industry requires waking up, as, indeed, others do. We have the technical schools, but at present only the City of London Guilds' examinations in gas manufacture; and the men who win the highest distinctions at them are frequently lost sight of afterwards, which I consider to be a reproach, for this is the juncture where the industry should look after the men of promise. I would like to see at least one scholarship provided for the winner of the highest distinction at this or some other examination which may eventually be arranged in connection with the new Institution. I make this as a suggestion to the Committee.

The commercial part of a gas engineer's education must not be lost sight of either. Napoleon once described England as a nation of shopkeepers; and I suppose it was the keen British instinct to trade which prompted the expression. Since then other nations of shopkeepers have arisen, and competitors for the title are keenly on the alert, and ready to steal a march upon us, wherever the opportunity may offer. Having regard to the large amount of commercial trading in connection with the gas industry, the question of the training of our students should have special attention paid to it. The commercial man who, by his business acumen, sagacity, and knowledge of materials, manufacturers, methods, and markets, is capable of purchasing the various commodities required in the business of a gas undertaking advantageously, and who can also sell, at the best market prices, the residuals produced or manufactured on a gas-works, is a commercial engineer as necessary to any concern as his *confrère* the civil engineer, whose C.E. designation is applicable to both; and when these qualifications are aptly combined, they should make the ideal engineer.

Matters of markets, of supply and demand, might be more frequently dealt with by our Associations, and, perhaps, Committees formed to consider the question of co-operation. The recent report issued by the Sulphate of Ammonia Committee affords us an example of the mutual benefits which may be derived by the producer informing the user of the advantages to be obtained from the rational use of sulphate of ammonia as a manure. The results of repeated and exhaustive trials are given, which amply demonstrate that the agriculturist can and does obtain larger crops, better quality of crops, with better feeding qualities and better keeping qualities, where this bye-product of ours has been used.

A few years ago, I was much exercised in mind as to whether or not it would be profitable to start the manufacture of sulphate of ammonia at Newmarket; and on seeking information from my experienced friends, several gave me the celebrated advice of "Punch," and said, "Don't," and prophesied that I should repent at leisure. We were getting practically nothing for the liquor after paying carriage to the station and disinfecting the town gratuitously by means of the liquor cart passing to and fro to the station, which was termed a nuisance. So it came about that a plant was put down, and I had to gain my experience as I went along. The plant we adopted was on the continuous system—a process literally true so far as I was personally concerned at this time—with difficulties of steam pressure, back-pressure and flooding on the saturator, burst joints on acid pumps and elevators, the refusal of the plant to make anything but mother liquor on occasions, thereby bringing into use innumerable barrels to store it in and making the place look like a busy brewery, except that the men who went through the ordeal with me reminded me that there was no beer.

During these early days of my experience of sulphate making, I was often reminded of my friend's advice—indeed, I might have repented, but that I had no leisure. After a few runs, however, we began to do better, until at the end of the first year we had made about 30 tons of sulphate. The next year we did better still, and in less than three years we had made as much net profit as the plant and building had cost us. Of course, we have gained experience, and the difficulties have been surmounted, until this year I am sanguine of producing over a ton of sulphate per 100 tons of coal carbonized. Seeing that prices are good, and a clear profit of £8 per ton can be made to-day, after paying all expenses, I need scarcely say that I do not regret commencing the manufacture of sulphate of ammonia.

I have seen the question frequently asked of late, "Should gas undertakings advertise?" I would answer emphatically, "Yes." We must advertise our wares and business, because it is a duty we owe to our customers, to ourselves, and because it pays. Useful information on the back of gas bills, advertisements in the local newspapers, and pamphlets on up-to-date methods and appliances for using gas are recommended; but the best of all advertisements is a good and well-equipped show-room, where the most modern burners and labour-saving appliances can be seen in action. I attribute much of our success to the establishment of the show-room, which enables us to turn over £1000 a year in gas apparatus alone.

Much attention has been given to public and domestic lighting, but too much cannot be done in this direction, because our friends and rivals, the electricians, are always on the alert and striving for supremacy. Where, however, illuminating effect, general utility, and economy are considered, electricity cannot hold a candle to the Welsbach and other incandescent lights; while gas used by means of the despised flat-flame burner can give electricity to-day, at the respective Newmarket prices, a good start and a fair beating. The question of cost is not taken seriously into consideration by the majority of the Electric Light Company's customers; hence the competition is somewhat keen. Newmarket is wealthy, and the electric light is fashionable; but, notwithstanding, we have been able to show an annual increase during every year we have had the competition, while the price of our stock stands as high as any gas undertaking in the Eastern Counties.

Having regard to the economy which may be effected by lighting public institutions, places of worship, railway stations, &c., I

will give you two examples of churches which I have altered from flat-flame to incandescent burners.

ST. MARY'S CHURCH, NEWMARKET.

| | | | |
|---|---|---|---|
| Lighting account for 1900 with flat-flame burners was | £20 | 6 | 9 |
| ,, ,, 1902 ,, incandescent burners was | 4 | 19 | 8 |
| | £15 | 7 | 1 |
| Renewals during the year (13 mantles) | | 6 | 6 |
| | £15 | 0 | 7 |

A saving of over 75 per cent. of the gas used.

ALL SAINTS' CHURCH, NEWMARKET.

| | | | |
|---|---|---|---|
| Quarter ended March 31, 1902, flat-flame burners cost | £12 | 17 | 3 |
| ,, ,, 1903, incandescent burners cost | 2 | 10 | 1 |
| | £10 | 7 | 2 |

In this case, 80 per cent. saving was effected on one quarter's account, a much cooler atmosphere is obtained, and much more light is given in both churches. It is not to be wondered at that nearly all the places of worship in the town have since adopted this system of lighting.

Sir Frederick Mappin, at the last half-yearly meeting of the Sheffield Gas Company, gave some comparative figures relating to railway station lighting by electricity and gas which were remarkable, and made it quite clear that gas lighting is infinitely cheaper for station lighting, even where the railway company make their own electricity. Now, if the church lighting comparisons of flat-flame burners which I have mentioned apply equally to railway station lighting—and I think they do, because churches and railway stations are most regular in their hours of lighting—I do not hesitate to say that all the railway companies in the kingdom are wasting thousands of pounds a year.

If the comparisons mentioned above are compared with electric lighting, then the difference is even greater. The Great Eastern Railway Company have installed electricity at Newmarket Station, among others—at what cost I do not know, but I may tell you that their gas account is no less with electricity than it was without it. Therefore, I cannot be accused of jealousy in drawing attention to this subject of railway station lighting. Perhaps it is that railway directors have got the electric light fever, or that they feel compelled to adopt a costly light because it is fashionable. But whatever it is, one would think they would have a keener eye to busiuess than churchwardens.

Of course, no one has any right to complain of the way private individuals spend their money; but if I were a shareholder in a railway company, I should consider that I had a legitimate grievance to air if the directors paid such scant regard to economy as they are undoubtedly doing on many lines to-day on the item of lighting alone. If these remarks should come to the notice of the Directors of the Great Eastern Railway Company, I am bold enough to offer them "information from Newmarket" which may help them to save an enormous sum of money—probably not less than £50,000 per annum. There is no excuse for waste in any form, no matter what the circumstances are. Whether companies or individuals, it is clearly their duty to effect economy whenever it is possible; for the question of cost compared with utility is the prime factor in all matters of business, and makes all the difference between profit and loss. And this factor is decidedly in favour of gas for railway station lighting at all points.

Gas is used for illuminating all our public streets; the Kern and the Welsbach intensified burners being employed exclusively—the latter being fixed upon the identical columns from the Glasgow Exhibition. This system of street lighting gives such satisfaction that I do not think we are likely to lose the lighting contract, especially if our town councillors will compare Newmarket with Bury St. Edmunds, King's Lynn, Sleaford, or any other town lighted by electricity, and take into consideration the cost and effect. We have 602 prepayment consumers, about half of whom have a small cooker and the other half a boiling ring or g iller, in addition to two fittings. The average consumption last year was 11,084 cubic feet, and the yield £2 8s. 7d.

You will remember that at the King's Lynn meeting Mr. Smithard gave us his experience of leakage and damage done to his gas-mains, &c., during the carrying out of a system of main drainage; and in the discussion I stated that my Company were making a claim for similar loss and damage under similar circumstances. I am glad to say that what then appeared likely to lead to litigation has been settled in a friendly way by the Urban District Council meeting the Directors in conference. Though the Company have not received compensation to nearly the extent of the loss and damage they have sustained, inasmuch as they made a great concession from their claim to meet the Council and prevent unpleasant law proceedings, I refer to this again as a pleasing instance of town councillors meeting gas directors and settling their differences amicably. It would tend to promote good feeling, save time, inconvenience, trouble, and, possibly, misunderstandings, were conferences more frequent between local authorities and gas directors or committees.

Those of you who visit the gas-works will find little to interest you in the way of novelty. Our works are plainly constructed to serve the purpose we all have in view—viz., to supply the public with the best possible gas we can produce suited to present day requirements at the lowest possible price, together with the best appliances for giving the consumer the highest value for the money spent with us. You will, however, see at an interesting stage of its construction an installation of regenerator furnaces, which my Directors recently decided to adopt, on my advice, in place of direct-fired settings, which I do not despise, as we have always obtained good results from them. Whether to put in shallow or deep regenerators, and the number of retorts per setting, were the first things I had to determine. I came to the conclusion that the deep fuel bed would give the most recuperation, and that settings of eights would be the most suitable, and, perhaps, be more economical in fuel than settings of sixes.

After considering the various types of regenerators, together with prices, the "Waddell" type was decided upon, which is a new tubular regenerator. These tubes are 12 inches in diameter 1½ inches thick, made of fire-clay, jointed together by spigot and socket joints carefully caulked with a mixture of silicate and fire-clay. To get the best results from any form of regenerator, it is essential to have no short-circuiting between the secondary-air and waste-heat flues; and in this system this risk is reduced to a minimum, as there are so few joints. Each of the tubes is also provided with four outside ribs, which bring the outside dimension of the tube up to the outside dimension of the socket—thus giving a level bearing, tube to tube, and also along the side walls. The tubes convey the waste heat from the setting to the main shaft, and are connected together by means of fire-clay arch-pipes. The secondary air is divided into two streams, which travel horizontally along the outside of the waste-heat flues. Both waste heat and secondary-air flues can be readily examined from the outside by means of sight-hole boxes and plugs, and the tubes, being only 1½ inches thick, will readily give off the waste heat to the secondary air. Another feature of this form of setting is that the waste-heat flues are practically surrounded by secondary air, and should give large recuperative power. I am satisfied that the principle is a good one; and I confidently look forward to obtaining favourable results.

Profit-sharing or co-partnership and the relationship of capital and labour are subjects which we have heard a good deal about lately, and they afford us food for profitable thought, and, perhaps, application. The ground has, however, been so well trodden by experts quite recently that it would be futile for me to attempt to interest you, much as I sympathize with, and approve of, the the principle. But there is just one item bearing on it which may be of interest to those who, like myself, cannot go in for co-partnership as a whole. It is a system of payment by results, which I adopted some time ago and which has worked very well. The stokers are paid a fixed minimum weekly wage, and for all the gas they make over an agreed quantity they are paid extra at the rate of 2d. per 1000 cubic feet. I think it is a fair basis, and it gives satisfaction to the men.

New appliances for retort-house use are coming thick upon us just now. Only the other day we had the vertical retort reintroduced, with improved results, the De Brouwer charging-machine, and the Fiddes-Aldridge gas-stoking machine. These inventions, and many others of recent date, tend to show that the industry is making real progress, and the mechanical appliances are all means towards cheapening production.

The prospects of the industry were never brighter than at present. Gas for domestic lighting, heating, and cooking has a great future, and for motive power and public street lighting it has immense scope—indeed, its uses are manifold, and the possibilities of further development are great. I have no doubt that our chemists have still many heat units and candles to discover from it, which will eventually make it still further indispensable in our homes and places of business. One of the very latest applications of gas is that when our poor weak natures "shuffle off this mortal coil," it is to be used for the final destruction of our bodies, by incineration at the Lawnwood Crematorium, near Leeds.

In bringing my erratic address to a close, I would congratulate the Association on the success it has achieved in the past, and at the same time would urge every member to greater efforts to promote its further usefulness, by coming forward with papers, which need not necessarily be on subjects brought to a successful issue, but on our failures, for these generally provoke the most useful discussions and bring out encouraging hints, help, and enlightenment.

Much has been done to make gas popular; but there is still much more to be done. There are too many houses without gas, and too many without incandescent burners and cookers. It is, therefore, clearly our duty not to relax our efforts to put plainly before the public the benefits and advantages which will accrue to them by a moderate and intelligent use of what is undoubtedly the most useful and reliable "domestic servant" of the present day.

At the close of the address,

Mr. ALEX. MITCHELL (Bury St. Edmunds) said he had a very pleasant duty to perform, and that was to propose a vote of thanks to the President for his address, which he was sure the members generally would acknowledge was one of the greatest ability. Some of them—himself among the number—had known the President for about twenty years, and had had a very high opinion of him; and this opinion had been enhanced by what they had just heard. He was sure they would all agree that the address had gone over one of the widest fields that any President could have entered upon just now. Their President had taken up the subject of gas lighting, and had treated it in a way which every one of the members would feel was not on the old beaten

track. He had given them, from his point of view, the greatest interest possible in every branch of the subjects he had touched upon. All the members would find in the address something which would go home to them—even if it was only the high price they paid for the carriage of their coal to the Eastern Counties gas-works. Directly on the east coast and in the Midlands, the gas-works got their coals at 4s. or 5s. per ton less on the carriage alone; and managers who were not so well favoured were often asked to compete, and make gas on the same lines as to cost. In the details of the President's address, all of them would find much with which they could agree. There was one point, however, they could not agree with. The President said the electric light could not hold a candle to the Welsbach incandescent light; but for once he happened to be wrong. If the President lived in his (Mr. Smith's) town, he would find that the incandescent electric light did hold a candle to the Welsbach light, though it did not hold much else. (Laughter.) This, however, was only by the way. He was perfectly sure he was expressing the opinion of the meeting when he said that the members greatly appreciated the very able address they had listened to.

Mr. F. SMALLBONE (Woodford) seconded the motion, which was very heartily agreed to.

The PRESIDENT, in reply, said he had only done his duty. He had intended, had time permitted, to suggest that if there was anything in the address that members cared to discuss, they were perfectly at liberty to do so. But as their time was limited, he would at once call upon Mr. Cutler to read his paper.

### STEEL CONSTRUCTION IN GAS-WORKS.

Mr. SAMUEL CUTLER, jun. (London), then read an exceedingly instructive paper on the above subject. This, with the discussion, will be found on p. 739.

### THE NEXT MEETING.

The PRESIDENT stated that the Committee had decided to recommend that the spring meeting of 1904 should be held at Peterborough. He proposed a resolution to this effect.

Mr. WIMHURST, in seconding, said it was some years since the Association met at Peterborough; and they had very pleasant recollections of their visits there.

The proposition was heartily agreed to.

### VISIT TO THE GAS-WORKS AND OTHER PLACES OF INTEREST.

Leaving the Rothsay Rooms, the members were kindly permitted to visit the old and celebrated premises of the Jockey Club in the High Street. Mr. Thomas Jennings (who is one of the Directors of the Gas Company) acted as guide; and, indeed, it is due to him to say that much of the pleasure of the afternoon was the outcome of the kindly interest he from the first took in the visit of the members.

From the Jockey Club, the party were driven to the gas-works; and in an adjoining pleasant enclosure they were photographed. Only a short time could be spared to inspect the works, which are a picture of neatness and compactness. In the retort-house the visitors were highly interested in the construction of a bench of four settings on the regenerative principle; the site having been previously occupied by direct-fired settings. Before the conversion from one system to the other could be effected, a difficult task had to be encountered. On the excavations being made, it was discovered that the foundations had been made of solid concrete; and this had to be cut out to the depth of about 10 feet. The arches are singles, with eight 9 ft. 6 in. retorts in each, 21 in. by 15 in. ⌂; and the settings are fitted with Waddell's patent tube regenerators. The bench is connected up to the old chimney; and the fittings consist of 6-inch ascension, arch, and dip pipes, and separate hydraulic mains for each bed. The work was in an interesting stage of construction. Two of the beds were complete, and were under slow fire; while the other two were ready to receive the retorts. The subway is formed by a concrete floor paved. It is 8 feet deep, and 8 feet wide; and access is gained to it by steps outside the house. The subway is ventilated by cast-iron grates. The furnace is fitted with a patent arrangement of shoot and door—the latter being of the wedge-valve type, with faced door and faced frame, so that a perfectly tight joint of the door is obtained. A coke-hopper is placed underneath the centre mouthpiece of each arch. When it is desired to draw coke into the furnace, the hopper is pulled out, and at once falls into position. These new settings are being constructed by Messrs. R. Dempster and Sons, Limited. The other feature of the works in which interest was particularly shown was Pettigrew's sulphate of ammonia plant.

On leaving the gas-works, the members drove to Sir John Blundell Maple's celebrated stables, where they were shown the whole stud. A most interesting time was spent here, and every courtesy was shown the visitors. It was a treat which was very highly appreciated.

The return drive ended at the White Hart Hotel, where the members dined together—the Chairman and Directors of the Gas Company and several other local gentlemen honouring them by their presence. The usual toast-list was gone through; the speeches all being appropriate to the occasion and the town in which the members were assembled. The enjoyment of the evening was a fit ending to a very useful and happy meeting, the success of which was in a large measure due to the exercise of the well-known energy of Mr. Troughton in his new office.

## THE SOUTHERN ASSOCIATION AT THE EAST GREENWICH GAS-WORKS.

The circumstance which led to the postponement of the customary visit to the President's works from the end of the spring to the end of the summer (if such the curious medley of climatic changes of the past few months can be called) is one which cannot be regretted in itself, nor can it be if the delay brought about a date for the event which proved itself to be so suitable for a day's absence from professional duties to large numbers of the members. The preparatory work all over the country for the coming season's gas manufacture is well in hand and is being brought to completion; the annual holidays are about at an end; and just now there is no great rush on gas-works, even if the fall in temperature has produced a demand for gas above the normal in these particular weeks of the year. Therefore members to the number of about 80 found last Thursday to be very convenient for accepting the invitation to take a turn round that huge creation of the South Metropolitan Gas Company at East Greenwich, of which their President (Mr. J. Tysoe) has charge. It was only right that the visit should be postponed, in order that the President might have the satisfaction of conducting the Association round the extensive and celebrated plant, with the large growth of which and the breakings out into new channels he has shown such striking ability in keeping a controlling pace.

### AT THE WORKS.

The 50 per cent. or so of the total membership of the Association constituting the visiting party reached Maze Hill—the nearest station on the South-Eastern Railway—just before noon; and there they found their President. Greetings over, conveyances soon transferred them to the Blackwall Tunnel entrance of the works. There the party were joined by the Company's Chief Engineer (Mr. Charles Carpenter) and the works' assistants. Both Mr. Carpenter and the latter placed themselves unreservedly at the disposal of the big company; and so rendered to the President invaluable assistance. It is difficult to say much that is new about what the members saw on the works, as readers of the "JOURNAL" have been kept immediately acquainted with all happenings there that have any general interest. Only on June 23 last, an outline description of the works was published, together with an account of the large extensions in progress; and the time that has since passed has simply brought the new work then described nearer to the state of completion.

A few notes, however, may be of interest. The large party gazed at, and examined, as many of them have done before, but still with interest, the tremendous gasholders which stand by the Blackwall Tunnel entrance. Then they transferred their attentions to the adjacent building which contains the 36 and 12 inch governors and the gas-engines driving the high and low pressure Sturtevant fans. The use of these fans is well known; but in a remark or two, in welcoming his visitors and explaining the plans for the day, the President stated that when the holders were full, they had ample pressure for all requirements; but when there was only one lift of gas left, there would only be a pressure of about 28-10ths, while sometimes as much as 50-10ths are needed. Then the extra pressure is put on by means of the fans. The fans enable them to exhaust nearly all the gas in store. He instanced how, on one occasion, one of the holders was empty, and the other only about 6 feet up; and had the fans not been available, there would have been at least 4 million cubic feet of gas in the holder which they could not have touched. The party then visited the new plant which has been put down for washing and separating the refuse coke and clinkers from the retort-houses, and the accumulations of deposits about the works. Great interest was evinced in this plant, which (as stated when describing it in June) was erected by the Hardy Patent Pick Company. To that description it may be added that the plant is capable of dealing with 20 tons of material an hour; so that, working ten hours a day, it is able to deal with 200 tons—a 9-horse power "Stockport" gas-engine being more than equal to the driving power required. So successful is this newly adopted adjunct (which we believe is the first example of a plant of the kind in a gas-works) that an extension is projected. Naturally the plant came in for a good deal of comment, but favourable—the only doubt being as to whether it would pay a moderately-sized works to put one down.

### HOSPITALITY.

After a good inspection of the coke-washing plant, the visitors were invited to the men's lobby, which was gaily decorated; and there they were entertained by the Chairman and Directors at luncheon. For this part of the programme, Sir George Livesey had managed to free himself from the day's engagements for a sufficient time to be present. At the close of the luncheon,

Mr. CHARLES HUNT said there was one duty which, he was sure, all present would wish to be performed, and that was to pass a very hearty vote of thanks to the Chairman and Directors of the Company for their great kindness in opening the works for inspection, and their hospitality to the members that day. The Company, as those present knew, stood that day, as it had stood for many years, foremost as the most progressive gas undertaking in the world. He need not enlarge upon this topic; but he might

say that not one of the least of its characteristics had been the readiness with which the Company's leaders (and he referred particularly to Sir George Livesey) had at all times thrown open the works to the inspection of the gas industry, to the members of which they had given every facility for availing themselves of the Company's large experience. He therefore asked the members to pass, by acclamation, a hearty vote of thanks to Sir George and his colleagues.

The proposition having been agreed to by acclamation,

Sir GEORGE LIVESEY, in his reply, said there were three of the Directors present to represent the Board—his old friend Mr. Robert Morton, Mr. H. Austin (one of the Workmen Directors), and himself; and they had with them Mr. Carpenter and Mr. Tysoe. He could only say they all appreciated very highly the expressions that had fallen from Mr. Hunt's lips; but as to thanking the Company for having opened the works to inspection, that he could hardly accept. It seemed to him it was the duty of them all, wherever they might be, to give facilities to their professional brethren for acquiring information. They were very glad indeed to see the members of the Southern Association there, and to explain to them and let them inspect anything or everything that was to be seen. In designing the works, they had gone on the plan of having separate sections, or what were really separate complete gas-works, excepting the gas-holders. There were four of these works; the fifth was now being built; and there was room to extend to twelve. They were each intended to produce 5 million cubic feet of gas per day; but it was found that they could make 6 millions. That generally was the idea of the plan of the works. In reference to the visit of the members, he was sorry he did not know them all. The time was when Mr. Morton and himself knew most of the members. But a good many new men had come in; and they were glad to see them rising up to take the place of those whose work was nearly done. There was only one other point. He did not think the South Metropolitan people had so much of the sincerest form of flattery as they would like—that was to say, imitation. One thing particularly he should like to mention with regard to the workmen. The Company some time ago increased the men's breakfast time from half-an-hour to three-quarters; and nothing had given greater satisfaction than this small concession. It was one of those things that showed consideration for the workmen; and it was a matter of much gratification to them. He wished this was imitated by employers throughout the country, as he was sure it would give their men the same amount of satisfaction as it had done in the case of the South Metropolitan Company.

### New Members—A Cute Honorary Secretary.

The HON. SECRETARY (Mr. J. W. Helps, of Croydon) remarked that six applications had been before the Committee from gentlemen who desired to become members of the Association. They did not, as a rule, do business at the summer meeting; but he was particularly anxious to get them elected that day, because they had a rule which exempted members who were only elected at the November meeting from paying subscriptions for the then current year. If these six gentlemen were elected that day, they would have to pay their subscriptions.

Sir GEORGE LIVESEY: That seems a piece of sharp practice. (Laughter.)

The HON. SECRETARY (continuing) said the names of the nominees were: Mr. Laurie Trewby, of Mill Hill; Mr. Stanley H. Jones, of the Commercial Gas Company; Mr. John Watson, of Milton-next-Sittingbourne; Mr. D. E. Garlick, of Glastonbury; Mr. Hamilton Baker, of Reading; and Mr. Henry Hill, of Rickmansworth.

The PRESIDENT humorously remarked that it was the duty of the Committee to increase the funds as much as possible.

The nominations were unanimously accepted.

### Further New Features on the Works.

This agreeable break in the prescribed course of inspection having been consummated, the members were soon interested in the work proceeding at the jetty. There they saw one of the coal ships being unloaded. It was a vessel carrying some 2500 tons, and is one of the largest dealing with the coal supply to the works. At present the unloading is performed by cranes and huge buckets; and it takes about 15 hours to deal with a vessel of such burthen as the one then alongside the jetty. The existing part of the latter is not sufficiently strong for the use of grabs; it is ⅂ shape; but it was seen that a large extension is now being made, which will convert it into a ⊤, and then travelling cranes with Hone's grabs will be adopted, which will discharge coal from the ships, into continuous overhead hoppers, under which railway waggons will run. The jetty is in communication with the coal-stores by an elevated railway. The station meters, in concrete tanks sunk into the ground (which saves the expense of a meter-house), were passed *en route* to the new extensive set of purifiers, which have been constructed (by Messrs. C. & W. Walker) for dealing with the section of works (No. 5) now being brought to a finish. The usual practice at these works has been followed in the design and construction of these boxes. There are four lime boxes and two oxides; and they are each 70 ft. by 30 ft. The boxes are simply constructed on concrete supports to form the basement, after the manner of the plain but strong design which characterizes the works throughout. The lime boxes are divided into three compartments, and the inlet-pipe to each is similarly divided, so as to secure an equal distribution of the gas through the material. A walk through the engine and exhauster house and the roomy and beautifully equipped workshops brought the visitors into the new engine and exhauster house, where they saw the plant being installed for dealing with No. 5 works. The house is of sufficient size to take the plant that will be required in future for Nos. 6, 7, and 8 works—when (the wonder is when!) they are required. Outside of the workshops by the way was seen in course of construction the simple lifting apparatus which the Company are making in their own shops for the new set of purifiers.

### Twenty Retorts in a Bed.

Coming to the new retort-house, the members saw something that occasioned surprise and excited much inquiry; and that was the new bench of settings containing no less than twenty through retorts in a bed, or forty mouthpieces. Readers who were interested in the brief reference to these settings that was made in the "JOURNAL" for June 23, are no doubt hoping to learn something more about them; but there is in truth little more to tell, and will not be until a thoroughly good trial has been made of them. The main feature is that each bed contains twenty 13-inch round retorts, with mouthpieces tapering to 14½ inches; and one furnace serves every three beds. At present, only one-third of the house is occupied, with twelve settings; but the foundations are in for further extensions when needed. Whether the extensions will be on the same system depends upon the success of the present unique bench. The proposal is to charge the retorts every three hours; the idea being to have small charges, and to burn them off quickly, so as to realize a large make of gas per ton of coal. While the bench was being inspected, Mr. H. E. Jones expressed his conviction to a little party of interested observers that the system was the correct one. "My father," he said, "used 15-inch round retorts. They worked long, and they worked well, and gave a good coke and a large make per ton." The main point about this new departure is that the Company believe that they will, by it, secure the largest make per ton of coal of the lower quality of gas (14-candle) they are now called upon to supply, and in the most economical manner. If this proves correct—and experience at Old Kent Road with an experimental setting has justified the erection of this bench—a considerable extension of this plan of construction and working will follow. The mechanical method of charging the retorts has yet to be determined; and during the coming season they will be charged by hand.

A walk through the other retort-houses brought the visitors to No. 1 house, in which they saw fifteen beds of ten ⊏ retorts being reset. In this case there is a generator to each bed. This renewal work was in various stages of progress, so that a good examination of its character could be, and was, made. Then the visitors spent half-an-hour in the fine new chemical works; but for a general account of what they saw there, we cannot do better than refer readers to what was said about them in the article published in June (p. 892).

### Dinner at the Crystal Palace.

With the inspection of the chemical works, the visit ended; and the members were next transported by brakes to the Crystal Palace. The drive, which occupied about an hour and a quarter, was thoroughly enjoyed. Dinner was served in the Garden Hall; and it was as great a success as had been the earlier part of the day's proceedings. There were a few toasts; and the speeches which accompanied them were not devoid of something more than passing interest. The toast of "The King" was heartily honoured. Then quite an ovation was accorded to that veteran gas engineer, Mr. George Anderson, on his reappearance at a social function of professional *confrères;* and he quickly proved that he had not lost his old form of buoyancy as an after-dinner speech-maker. He proposed the toast of the "Southern District Association"—of course coupling with it the name of the President, Mr. Tysoe. A few extracts from one or two of the subsequent speeches must not be omitted on this occasion.

The President, in the course of his response, said he did not know that any apology was necessary on account of the altered time of this meeting. It was due to his absence abroad;* and one of the troubles he had to worry him in South America was the fact that he was throwing out of gear the arrangements of the Southern Association. As their President, he did not feel altogether comfortable about this. He left England on the 1st of April; and he certainly thought that by the end of June, he would have reached home, and that the Southern meeting would have taken place as usual. But the end of June arrived, and still he could not get home; and he could not see how it was possible to have a meeting at all. He felt that it was utterly impossible for the members to visit the President's works in the absence of the President. However, he arrived home about the middle of July. A Committee meeting was immediately called; and after considerable deliberation, it was determined that the best course would be to postpone the visit until September. The result that day showed they were not far wrong. Someone whispered to him that it was a record meeting. He was pleased to think it was so. It had been his pleasure on several occasions to show many of those present round the East Greenwich works. That day it

* The recent articles on the monazite sand question explain the reason of the President's absence.

had been a double pleasure to him—first as Manager of the works, and secondly as President. Many of the members were accustomed to works of a very different character. It would have been noticed that they were not embellished with artistic features; and some might think that, in the design and construction of the works, the Company had been severely practical. There was no doubt that in their design, they had adopted this principle: Everything for use, and a use for everything. He trusted they had succeeded in attaining that ideal. Under the guidance of their Chairman (Sir George Livesey), who was a member of the Association, the motto of the Company had been "Efficiency, and not ostentation, and everything for a purpose;" and this they had endeavoured to carry out in every way. Of course, some works were of such a nature that when the drawings were reproduced in the technical journals, they made a very excellent appearance, and gave very great pleasure to those gentlemen who inspected them. He was afraid that the East Greenwich works would not show up quite so well in that respect—(laughter)—nor did he think it would pay them to erect works that would do so. Their own policy he was convinced was the best one. Nothing succeeded like success; and he believed the Company had been very successful in the erection of their works. He sincerely thanked those present for the kind way in which they had received his name.

The toast of the Hon. Secretary was proposed by Mr. H. E. Jones, who, after he had referred to the inestimable qualities of Mr. Helps as a worker in the gas industry, remarked upon the works they had been visiting—describing them (no matter what might be the opinions of those present as to the æsthetic quality of tar as a paint for gasholders) as the beau-ideal of what a gas-works should be for producing cheap gas under strenuous testing conditions for high qualities. They were incomparably the best of the most important works in that part of the country; and the fact that they did supply gas of the best kind at the cheapest possible rate was a proof of their efficiency. He knew of only one other works in the kingdom of large magnitude in which there was nothing superfluous; and those were the ones which were not yet quite completed at Provan for the supply of Glasgow, and which were designed by an eminent Engineer, the late Mr. William Foulis. He would say to the young men of the profession, "If you visit the East Greenwich and Provan works, you will have had before you two good lessons for life." He said this in the presence of Mr. George Anderson, who many years ago was the Engineer of the Great Central works at Bow Common. Those works had lasted a considerable number of years, and had done good and efficient work. That was what they wanted.

The toast was heartily honoured, and Mr. Helps just had time to acknowledge it before the fireworks display commenced in the grounds. One point in Mr. Helps's speech reminded those present of the fact that he has held the Hon. Secretaryship now for fifteen years.

The fireworks were witnessed from the hall in which the evening had been spent; and their finish also brought to an end one of the happiest outings of which record will be found in the Association's Transactions.

## SOUTH-EAST OF IRELAND GAS ASSOCIATION.

The Summer Meeting of this Association was held at Dungarvan on Thursday, the 3rd inst.—Mr. R. Bruce Anderson, Assoc.M.Inst.C.E., in the chair. Two papers were read—the first being by Mr. J. Richmond (Kilkenny), on "The Camera in Gas-Works;" and the second by Mr. G. Lennon (Dungarvan), describing the works under his control.

Mr. Richmond exhibited an album of photographs he had taken of portions of his plant during the past two or three years, and pointed out how useful and easy it was for a manager to obtain and preserve a record of past, transitory, present, and covered-in and concealed apparatus, piping, gear, scaffolding, &c. He explained that before removing plant his rule was to take a photograph of it, so as to have on record a view of what used to exist; when making extensions and alterations, to photograph the gear used, the men employed, and the temporary connections run; and when laying mains, the trench work before filling in, in order to show unmistakably where the pipes run, how the underground connections had been made, the run of the sockets, and the position of the T-pieces, bends, &c. He estimated that £5 would amply cover the needful equipment, and put the cost per print at 2d., not reckoning the time occupied. He added that he had first started photographing his plant as an amusement, but quickly saw the utility of doing it systematically.

A discussion followed, in which all present took part. Mr. Paterson (Tipperary) fully appreciated the utility of photographic records, more especially with respect to underground work. Mr. Norman (Dublin) remarked that, though photographs might not be admissible as conclusive evidence, such prints as Mr. Richmond had exhibited could not but be very convincing should any dispute arise in regard to the objects shown. Mr. J. G. Tooms (Waterford) considered that an album such as the one exhibited would result in a great saving of expense to a gas company on a change in management. He had been particularly struck with the great assistance the excellent photographs published in connection with Mr. Herring's description of his works at Granton had been to him (Mr. Tooms) in grasping the meaning of the mechanical drawings, which in the absence of photographs would have required much more study. He threw out the suggestion that if other members, as he thought was likely, took up this branch of photography, they might with advantage bring their prints to exhibit to each other at their quarterly gatherings. The President thought such an album as the one shown might save much dissension, on the termination of leases, as to what apparatus had been displaced. He felt that, whereas taking elaborate notes and making sketches of alterations was irksome, keeping a photographic record was more of a pleasant recreation, and had the great advantage of facilitating reference. Replying upon the discussion, Mr. Richmond gave some particulars as to his method of operating, and said his last work had been to photograph a roadway on which he had been mixing concrete, for which he had been threatened with a summons; and he wished to have evidence that he in no way obstructed the road.

In his paper, Mr. Lennon gave an interesting account of the promotion of the Dungarvan Gas Company and the establishment of the works. Acting on the advice of the then Member of Parliament for the district, Mr. J. F. Maguire, a local Company was formed, and the "foreign" contracting promoter kept at a distance. The works were constructed about 1857, to the plans of Mr. George Anderson, who was at the time carrying out the new gas-works in Cork. The Company had a successful career until 1880, when, owing chiefly to local hostility, the concern began to go back. This continued until the author's appointment in 1889, when his first move was to reduce the price from 7s. 6d. to 6s. 3d. per 1000 cubic feet. This bold step resulted in subsequent uninterrupted progress. He had a hard fight to get money to expend on improvements; but nevertheless during the past eight years he had practically reconstructed the works, and so satisfied the Company that a few years ago they had granted him a lease favourable to both landlord and tenant.

In the discussion which followed, Mr. Norman agreed with a remark made by Mr. Lennon, that well-maintained public lamps were the best advertisement a gas company could have; and he congratulated him on having ended the *interregnum* of street lighting by oil which had prevailed at Dungarvan. Mr. Tooms referred to the author's modesty in not describing his mode of constructing his new gasholder tank, which had formed a topic of conversation when the members were strolling round the works before the meeting. Taking advantage of the standing-up nature of the soil, Mr. Lennon had simply excavated a trench, and built up a 4½-inch ring of brickwork to a trammel guide, filling in concrete between the brickwork and the earth as he rose—thus getting a concrete tank with no expense for moulds. He (Mr. Tooms) considered this an ingenious and cheap method of construction. Mr. Tyndal (Carrick) strongly endorsed the advice given by Mr. Maguire in regard to having local shareholders, and cited in support of his opinion what was now being done by Sir George Livesey in South London. Mr. Richmond, on the other hand, argued strongly against the nationalist exclusiveness of consumers' companies, and said he did not believe benefits accrued from having local shareholders. The President followed on the same lines, and considered that, unless the undertaking were entirely locally owned, local shareholders were very undesirable, in view of their having conflicting interests.

## THE INCLINED RETORT-HOUSE AT BLACKBURN.

In the account which appeared in last week's "Journal" of the visit of the Manchester Institution of Gas Engineers to Blackburn, brief reference was made to the inclined retort-house at the Greenbank Gas-Works of the Corporation. This house was the central feature of the new plant which the President (Mr. S. R. Ogden) had to show his visitors; and therefore some supplementary particulars regarding it and its equipment may not be without interest.

The house itself was specially constructed for an installation of inclined retorts; and in it at the present time is one bench of ten settings of eight retorts—this being one-half the number the house will accommodate. The retorts measure 20 in. by 15 in. at the top, tapering to 24 in. by 15 in. at the bottom, and are 20 feet long on the incline, which gives a measurement of 17 ft. 1 in. horizontally from front to back. The retorts have a capacity of 7 cwt. per charge, which is put in every six hours. On account of the bad nature of the ground, the excavations for the foundations had to be carried very deep; being in places nearly 15 feet thick. The end piers are 3 ft. 9 in. wide, and the intermediate ones 18 inches; the centres being 10 ft. 9 in., which makes it necessary to take off the gas from two of the retorts by a single ascension-pipe, which is made 8 inches internal diameter and connected to the mouthpiece by a breeches pipe. There are two chimneys which Mr. Ogden decided should form part of the bench; and it was therefore arranged to extend the brickwork at each end, and carry it up to the height of the bench—on the top of this being placed the 4 feet square steel extension pieces which convey the waste gases just outside the retort-house roof.

The regenerators are divided into four, and are of the New Conveyor Company's old design, in which the secondary air enters by a flue placed against the producer, and the outgoing

gases are between it and the division walls. The main flue is 4 ft. by 4 ft., divided all along its length; so that by the aid of two dampers, the top and bottom halves of the settings can be separately controlled, and, as usual, each part of these is regulated by separate damper blocks placed in each bed—there being thus four dampers to each.

The furnace is constructed below the drawing-stage—the producer being charged on the front side, and the clinkering operations being carried on at the ground-level. The charging-doors are of cast iron in two pieces, closed by catches, which makes them air-tight; while the furnace doors, also of cast iron, are about 2 ft. 6 in. square, and provided with screw catches, and the usual sight and water holes. The primary air is led to the fire-grate through separate flues on each side of the doors; and as the holes from the flue are narrower at the front end, the supply is spread evenly over the whole of the grate.

The mouthpieces are 4 inches deep at the top, and 15 inches at the bottom, and are provided with 7-inch sockets to take the ascension-pipes. These ascension-pipes, as before explained, are arranged to take the gas from six retorts by 7-inch pipes; and, on account of the narrowness of the beds, the other two are connected by a breeches pipe to the seventh pipe, which is 8 inches diameter. This perhaps is not a good plan; but it was found unavoidable at Blackburn. The hydraulic main is divided into ten distinct lengths—one length for each bed—the connection being by 10 in. by 14 in. seal-valves. These are connected to the mains by $\frac{5}{8}$-inch bolts, and coupled to the 20-inch foul main by cast-iron saddle branches. The tar is taken from the foul main by 6-inch pipes placed immediately underneath; and at the end of the bench, the pipe dips into a syphon pot of the usual construction. The foul main is made up of $\frac{1}{4}$-inch plate, with 3-inch angle flanges. On one end a $\frac{1}{4}$-inch blank flange is fastened; while at the other an 18-inch rack-and-pinion valve is bolted, to couple up to the conducting main.

The superstructure of the bench is of strong construction; the buckstays being 16 in. by 6 in. girders, weighing 62 lbs. per foot. There are eleven on each side, and four at each end, all securely braced with transverse joists connected by 6-inch angle cleats. The crossstays to the producer are 8 in. by 4 in. by 25 lbs. per foot joists; and the main joists to carry the cast-iron floor plates 12 in. by 6 in. H steel and 8 in. by 6 in. cross joists.

The system of charging is the "shot-pouch," which has been described fully on several occasions in the "Journal;" there being, as usual, one chamber to each vertical row of retorts. The coal is led from the chambers to the mouthpieces by light travelling shoots; one being provided for each horizontal line of retorts. The coal-hoppers run the full length of the bench, and are divided into ten compartments; being carried from the back buckstays by means of cross joists, which find a bearing on the retort-house wall at the other end. The hoppers measure 7 ft. $1\frac{1}{2}$ in. deep by about 7 feet wide, and hold sufficient coal to last over the night shift.

There is a wide staircase leading from the ground-floor to the drawing-stage; this being placed about the centre of the bench. From this stage access is given to the charging-floor by a stairway built at one end of the bench. To get to the platform along the coal-hoppers, it is necessary to mount by a spiral staircase, which is built on to the charging-floor.

The machinery for the coal consists of a massive four-roll crusher, fed from a large hopper, which is fed either by trucks on the ground line, or by coal-waggons running on staging some 15 feet above. The elevator is of the completely cased-in design, having double chains, 6-inch pitch, fitted with 24-inch wide seamless steel buckets, at 2 feet pitch. With a speed of 80 feet per minute, 40 tons of coal per hour can be comfortably dealt with by this elevator. Delivery is made at the head down a shoot to the push-plate conveyor, which is about 110 feet long, and 24 inches wide. The two chains are of steel, and fitted with detachable push-plates at 2 feet pitch. The coal is directed to the hoppers through any of thirty slide-doors, and no trimming is necessary. The drive is by an 18-horse power gas-engine, working on to a countershaft, which connects by bevel gearing with a vertical shaft; and this in turn gives motion to a third shaft, which drives by belts on to the elevator and conveyor countershafts.

The coke-conveyor which Mr. Ogden chose is Little's old pattern patent carrying type, 18 inches wide. This was fitted originally in a cast-iron trough; but this gave so much bother through cracking, that it was wisely decided to take it out and substitute one of steel. Although the conveyor is of the old design, with malleable cast-iron chain, instead of the patent all-steel bushed chain, it works very smoothly indeed, and appears to carry the coke without breakage.

At the end of the bench farthest from the coal-elevator end, is placed a 24-inch continuous bucket elevator, which receives the coke from the conveyor, and carries it on the incline to the outside of the retort-house, where it delivers on to the cross conveyor, which is of the plate-belt design, and provided with three throw-off ploughs to deliver into the large coke-storage hoppers built over the railway line. The surplus coke can be fed to either of the two distributing-conveyors, each of which is 81 feet long by 24 inches wide, fitted with six ploughs to direct the coke to the storage yard. The drive for the plant is also taken from an 18-horse power gas-engine, which is located under the charging-floor.

It should be mentioned that the Contractors for the entire plant here described were the New Conveyor Company, Limited, of Smethwick.

# STEEL BUILDING CONSTRUCTION IN GAS-WORKS.

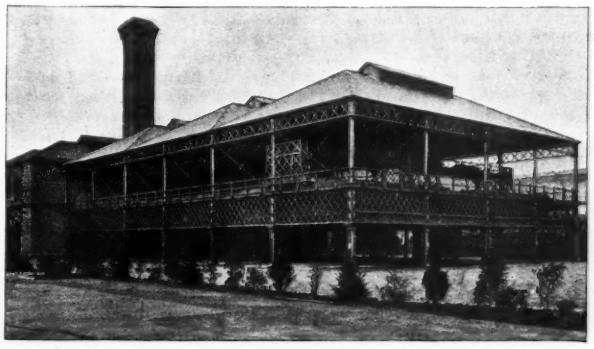
By Saml. Cutler, Jun.

[**A Paper read before the Eastern Counties Gas Managers Association.**]

Having been invited to prepare a paper for this meeting of the Association, I have selected as a subject that of steel construction as applied to buildings for gas-works as one likely to be of interest at the present time.

Modern methods of gas production involve the provision of buildings of greater height than did the older processes; and the use of metal either as a primary or reinforcing component is being increasingly adopted for such structures. The steel-framed purifier-house has now become quite familiar; being so well adapted for the purpose. An illustration of a comparatively early example of this type of construction is shown on Photograph A. It was erected some twenty years or so ago by my firm at the Basford Gas-Works of the Nottingham Corporation, from the designs of the late Mr. Tarbotton, the Municipal Engineer. The house contains six purifiers, each 35 ft. by 30 ft., supported on a girder stage, below which is the oxide revivifying floor. The covers are lifted by hydraulic travellers. The purifiers are fitted with 24-inch diameter water-seal valves; these being ranged along the centre of the house at the ground-floor level. This is, however, only by the way; for, as I have observed, this method of construction has become so common that it now calls for no special comment.

The buildings to which I more particularly wish to refer are those required for the accommodation of inclined retort-benches and carburetted water-gas plants, where well-ventilated buildings of considerable height, arranged for carrying the working stages, are necessary. The suitability of steel for the structural parts of



Photograph A.—Purifier House at the Basford (Nottingham) Gas-Works.

such buildings is unquestionable; but I am aware that there is a wide divergence of opinion existing in regard to the desirability and ultimate economy of using corrugated sheets for covering purposes, especially in gas-works—a point, it may be remembered, which was a good deal discussed in connection with a paper read by Mr. Walmisley on retort-house roofs a short time ago. *

It by no means follows that a steel-framed building must be a sheeted one, as there are many excellent substitutes in the various systems of reinforced concrete; or the steel framework may be filled in with brickwork, as is usual for warehouses and large offices, &c. But these methods are a good deal more expensive than corrugated sheeting, which is now being increasingly used, and forms, it will be noticed, a feature in all the examples of buildings I am bringing before your notice. There seems little doubt that such buildings, properly constructed, are quite satisfactory for housing gas-works apparatus, and, being economical in first cost, that they will be generally adopted.

Diagram No. 1 (p. 740) shows the carburetted water-gas house at Southall, which was included in the contract for water-gas apparatus we carried out in 1897 for the Brentford Gas Company, under the direction of Mr. Frank Morris, who was at that time Engineer to the Company. These buildings, which have proved in every way suitable for their purpose, comprise a generator room 62 ft. by 66 ft., accommodating four sets of water-gas plant of $2\frac{1}{2}$ million cubic feet capacity per diem, an engine room, 62 ft. by 33 ft., and an adjacent boiler-house. The height of the main building is 30 feet from the floor to the eaves, giving plenty of space above the operating stage.

The stanchions of the generator-house are 16 in. by 6 in. by 6 in. rolled steel joists, and those of the engine-house are built of double 10 in. by $3\frac{1}{2}$ in. by $3\frac{1}{2}$ in. channels, forming columns of suitable strength for carrying the large water-tank which covers the engine-room and forms a roof to same. The weight of the tank, when it is filled, is about 400 tons; the solid web girders,

* See "Journal," Vol. LXXV., pp. 1614, 1703.

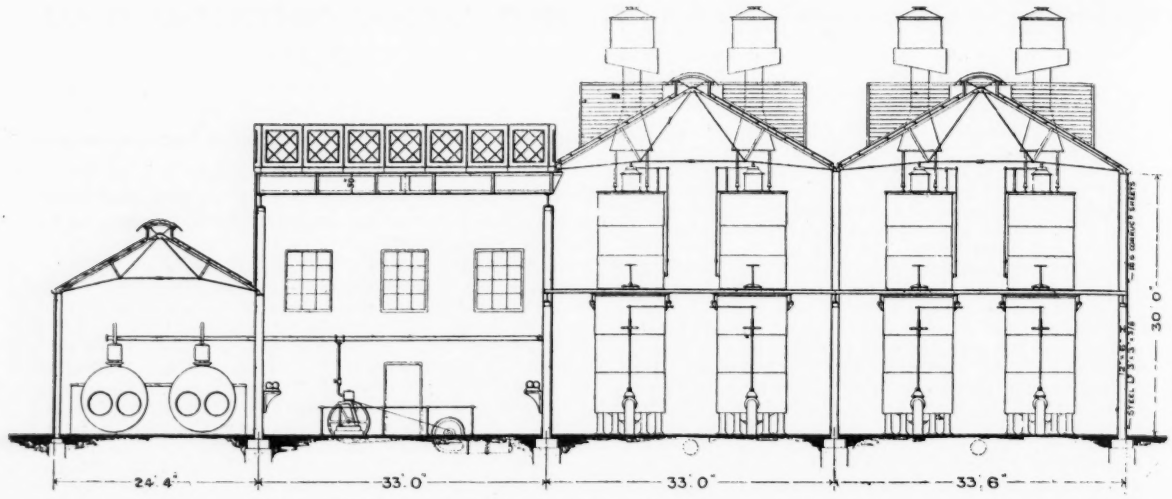



Diagram No. 1.—Carburetted Water-Gas House at Southall.

30 inches deep, supporting same having a clear span without intermediate supports. The walls and roofs of this range of buildings are covered with ungalvanized corrugated sheets, No. 18 gauge thick, and carried on steel angle purlins. The sheets were first coated with hot boiled linseed oil, and then, during and after erection, thrice painted with red lead paint.

Buildings of a similar character have since been erected in connection with other carburetted water-gas plants; and some views, taken during the progress of the erection of a building at Mitcham, are illustrated in Photographs B and C. A cross-section through the generator-house is also shown on Diagram No. 2. This house, with the carburetted water-gas installation, was erected in 1902, under the direction of Mr. Benjamin Green, the Company's Engineer. It abuts on an existing retort-house, but is made self-supporting; so its stability will not be impaired in the event of the adjacent retort-house wall being removed or altered.

The building consists of a generator-house, 54 ft. by 48 ft., to contain three sets of generating apparatus of 1½ million cubic feet combined capacity per twenty-four hours, an engine-room, 34 ft. by 48 ft., and a boiler house, 22 ft. by 48 ft. The total length of the range is 112 ft., with a height to eaves of 30 ft. 9 in. The roof of the machinery-house is uniform with that of the generator-house; but there is an intermediate concrete floor, 3 ft. above the level of the operating stage, which forms a ceiling to the engine-room, and provides a store above, for the general purposes of the Company. The roof is carried upon a series of arched latticed framed principals, so that the space below is quite clear of obstruction that would otherwise be caused by foot beams and tie-rods of ordinary principals. These curved principals have a span of 48 ft., and are carried directly on the main stanchions, formed of 14 in. by 6 in. rolled steel joists. There are five ranges of latticed purlin girders, placed respectively, at the eaves and ridge and midway between; the central purlin girder, formed with latticed spandril, ends uniform with the design of the principals. Two intermediate rafters of 4 in. by 3 in. by 3 in. steel joists are provided in each bay, and extend to the ground line. Steel angle purlins of 3 in. by 3 in. by ⅜ in. section complete the skeleton framing, to which are attached the galvanized corrugated sheets, No. 18 gauge thick, covering the roof, sides, and partition walls.

I now pass to a second series—namely, steel buildings used in connection with inclined retorts; and of these I have selected three examples of somewhat diverse design, which we have recently constructed at Southall, Swansea, and Dartford. The Southall building is to the design of Mr. Husband, the Engineer to the Brentford Gas Company, who succeeded Mr. Morris when that gentleman retired from the office of Engineer to become a Director of the Company. The house has a span of 50 ft., and is 246 ft. long, with a height of 42 ft. 6 in. from the floor to the eaves, and accommodates 25 beds of inclined retorts in a single line. The framework construction is illustrated in Photograph D, and consists of 12 in. by 6 in. by 6 in. steel stanchions of single-girder section, placed at 8 ft. 11 in. centres, and stayed laterally by steel joist purlins, 5 in. by 4 in. by 4 in.; these forming a series of rectangular panels, some of which were filled in with galvanized corrugated sheeting, and others left open for ventilation. The roof has ordinary open-trussed principals, coincident with the stanchions, and slated on angle steel laths, laid 10½-inch gauge in the usual manner. Wind bracing-bars are provided to triangulate certain of the side panels and the corresponding bays of the roof.

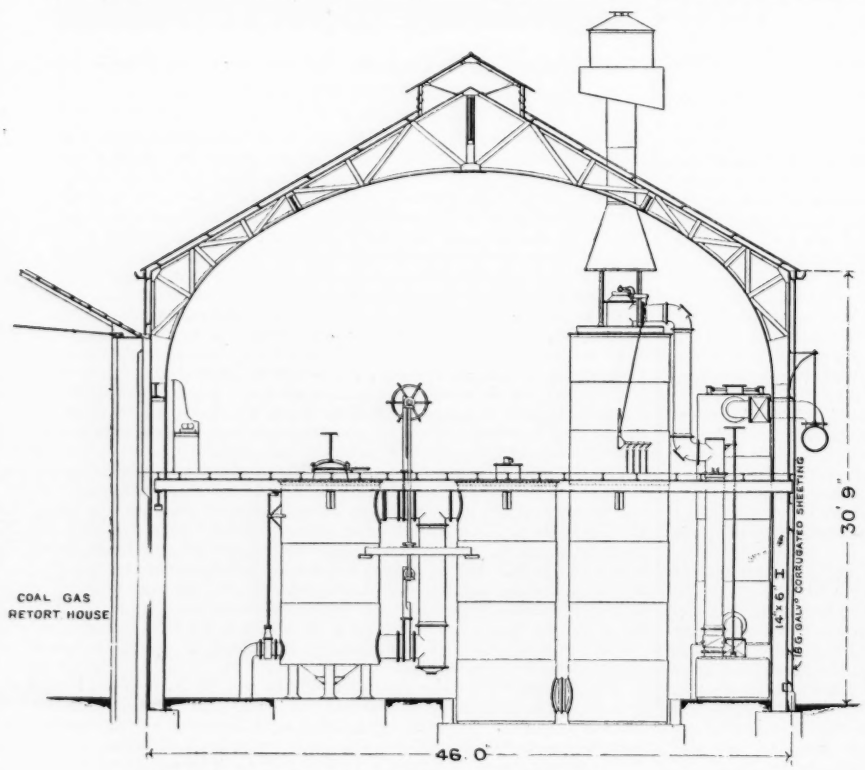
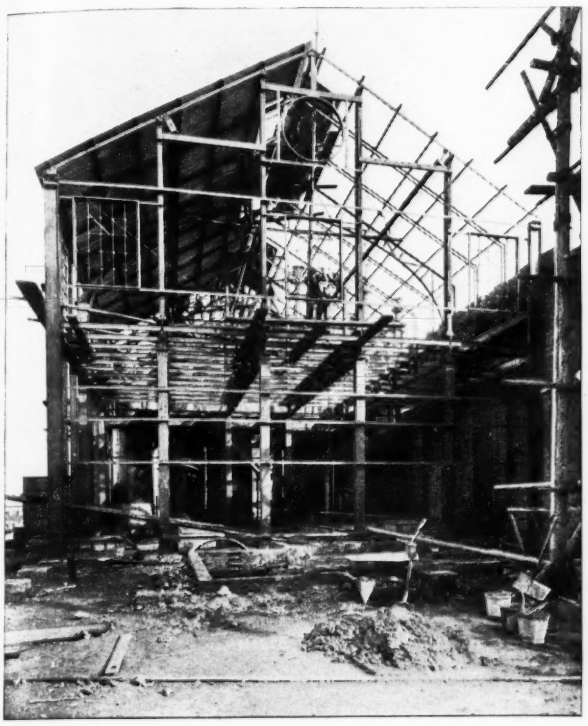
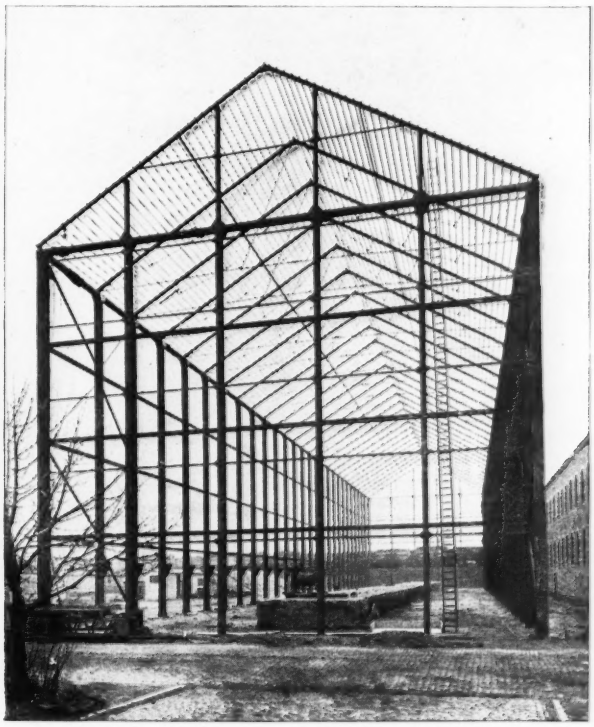



Diagram No. 2.—Carburetted Water-Gas House at Mitcham.

The Swansea building, shown on Diagram No. 3 (p. 742), is of considerable interest, both on account of its size, design, and the circumstances of its erection. As will be seen, the roof is of semi-circular form, and has a span at the ground level of 102 ft. 9 in. between the sheeting, and a height of 67 ft. from the ground to the top of the rib. Three views of the house are given—Photographs E, F, G. The circumferential girth of the building from ground to ground measures 193 ft. 6 in. The primary conditions laid down were that the building was to be semi-circular, and without any of the usual massive masonry side walls, that it should be of sufficient span to accommodate two lines of inclined retorts, with ample width for the charging and discharging stages, and yet come within the limits determined by the existing surrounding buildings. Also, the roof was to be



PHOTOGRAPH B.—THE MITCHAM CARBURETTED WATER-GAS PLANT BUILDING.

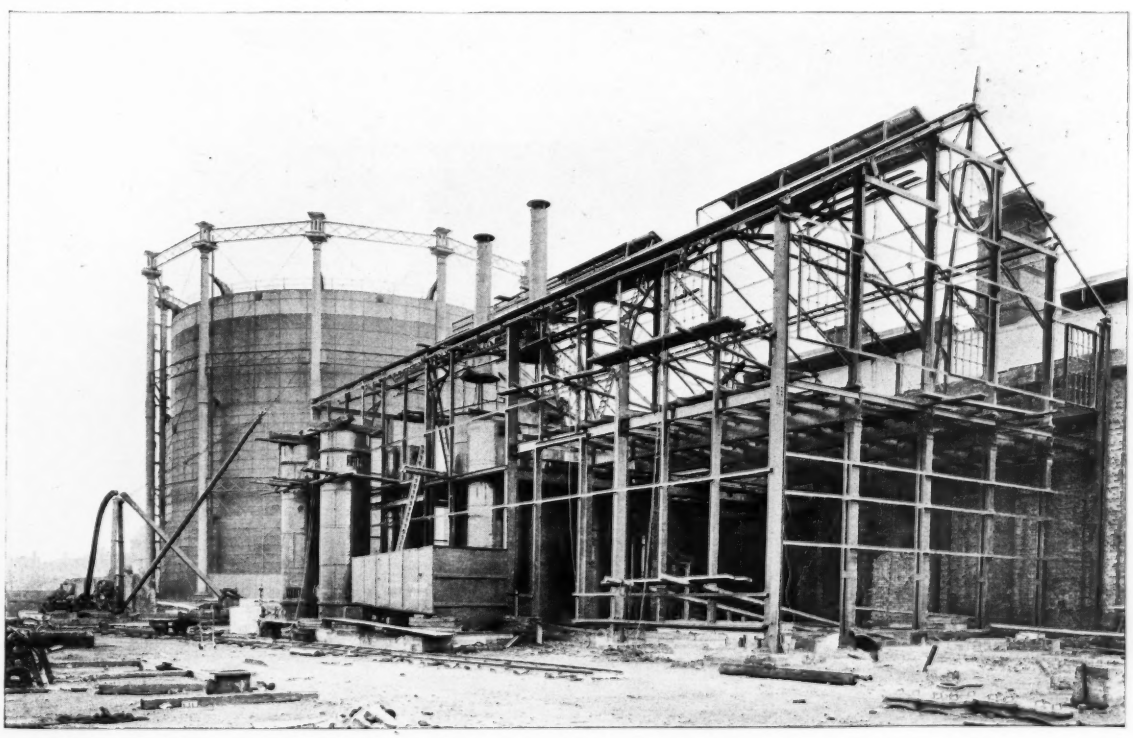


PHOTOGRAPH D.—THE STEEL FRAMEWORK FOR THE SOUTHALL RETORT-HOUSE.

erected over the existing benches of horizontal retorts covered with two small circular roofs, and the bench maintained in workable condition throughout the period of erection.

The absence of masonry side walls is an important factor in the design of this structure, as in the majority of latter-day designs of circular inclined retort-house roofs the arched girders are of secondary importance in the complete structure—springing from an abutment in the side wall and only partially supporting the rafters. In these instances, the walls transmit the roof load to the base, and also take up their due proportion of lateral wind pressure. In the Swansea building, the entire weight of the structure, and the wind-load on same, are carried by the main ribs, which, commencing on the ground level as cantilever bases, are continued, as circular girders, to form the arched principals of the roof.

The design involved a good deal of careful calculation; for, in the absence of side walls and transverse trusses, it was necessary to provide sufficient rigidity at the springing line of the arch to prevent any distortion of the true form above. The arched principals are constructed to resist the stresses due to a specified wind pressure of 50 lbs. per square foot upon the exterior of the building, in addition to transmitting to the base the dead-weight of the entire structure. The sections of the steel materials employed, when subjected to these maximum stresses, are strained to 7 tons per square inch of sectional area—thus giving an adequate margin of safety.



PHOTOGRAPH C.—THE MITCHAM CARBURETTED WATER-GAS PLANT AND BUILDINGS.

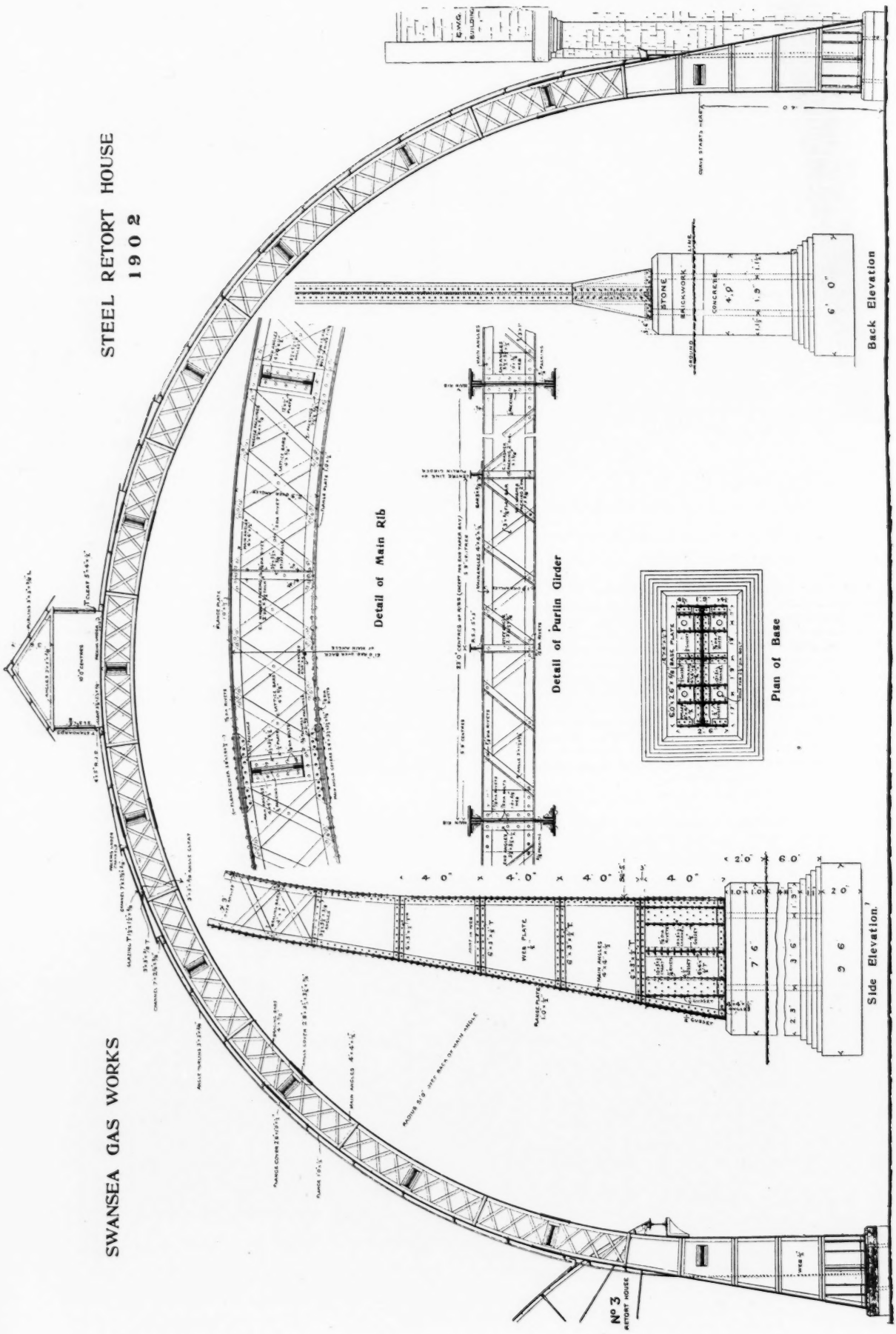



DIAGRAM NO. 3.—DETAILS OF SWANSEA RETORT-HOUSE ROOF.

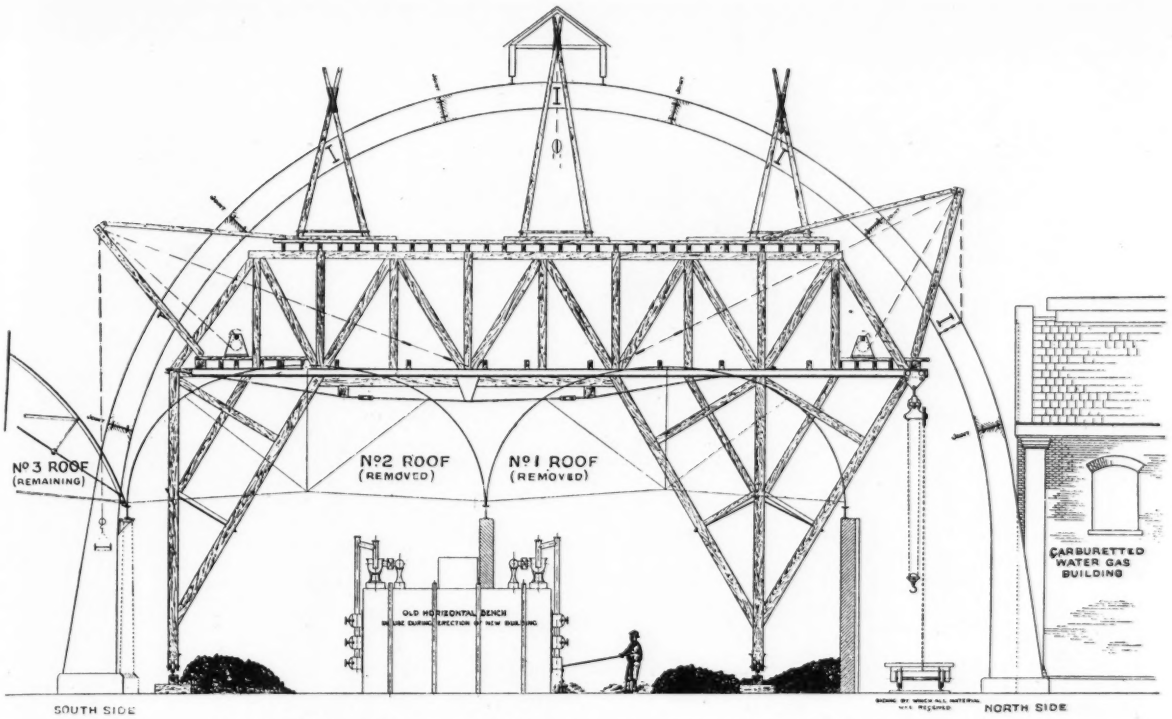
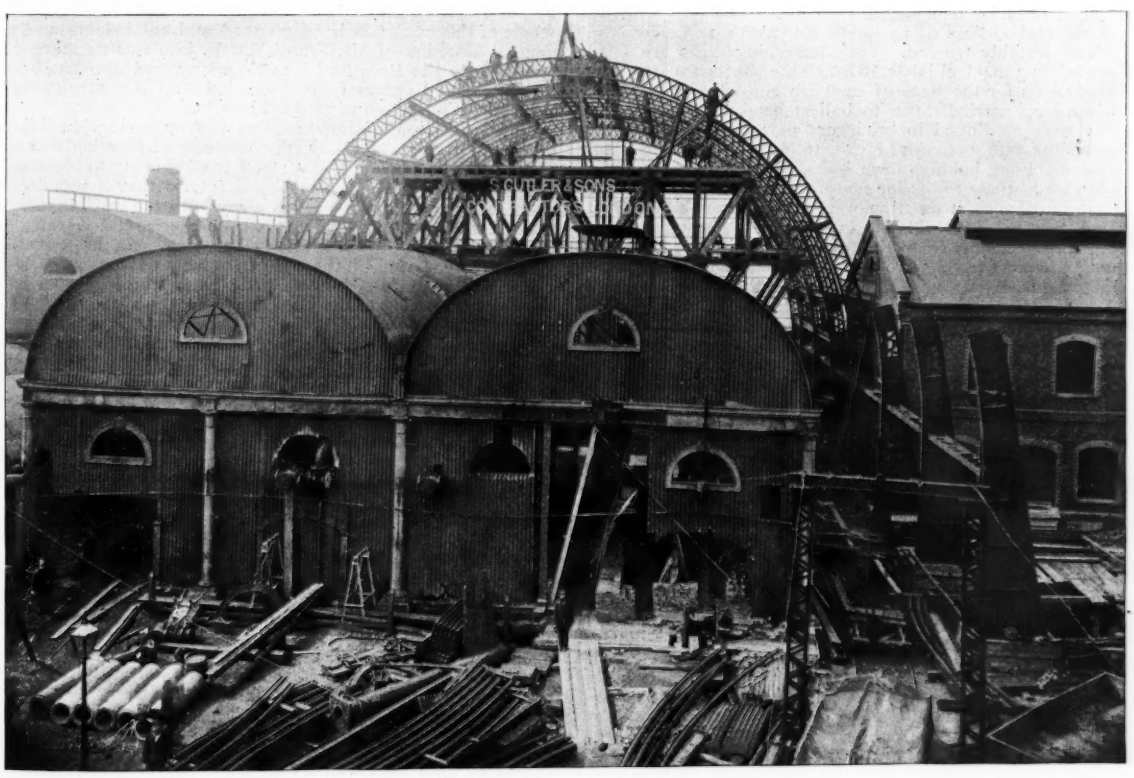



Diagram No. 4.—Method of Erecting the Swansea Retort-House Roof.

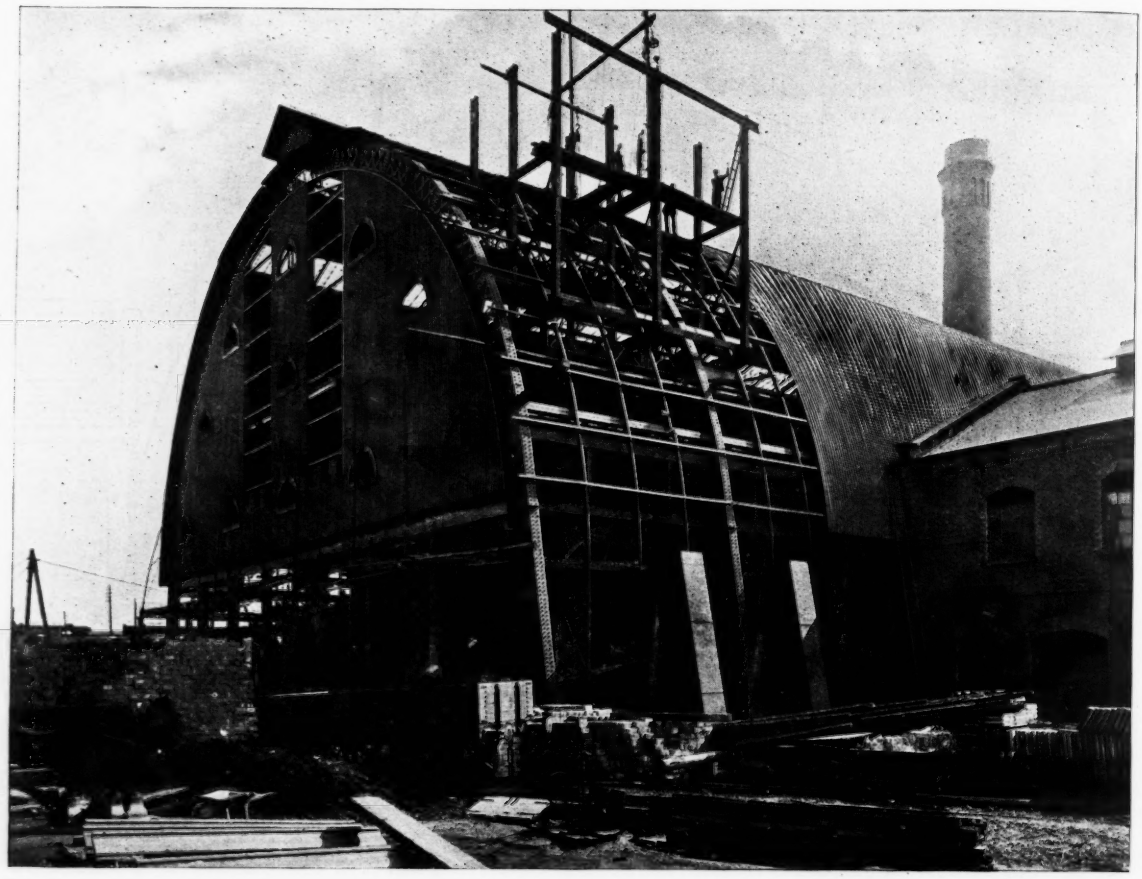
The main ribs are placed at 23 feet centres. They are 6 ft. deep at the base, tapering to 2 ft. 9 in. at the springing line of the arch, 20 ft. 6 in. above the base-plate. The flanges are formed of double steel angles 4 in. by 4 in. by $\frac{1}{2}$ in., with 12 in. by $\frac{1}{2}$ in. table plates. The lattices are 4 in. by $\frac{5}{8}$ in., double riveted. Extending between the main ribs are thirteen ranges of latticed purlins girders 1 ft. 9 in. deep, having flanges of double angles 4 in. by 4 in. by $\frac{1}{2}$ in., and web of 3 in. by $\frac{3}{8}$ in. steel flats for tension members, and 3in. by $1\frac{1}{2}$ in. by $\frac{3}{8}$ in. angles for compression members. These carry the intermediate rafters, and also act as lateral struts to the main ribs There are three intermediate rafters to each bay, of 5 in. by 3 in. by 3 in. steel joist section. These have a contour corresponding to the outer flange of the main rib, and so providing bearings, at a uniform centre of 5 ft. 9 in. for the 35 rows of sheet purlins of 3 in. by 3 in. by $\frac{3}{8}$ in. steel angles.

The galvanized corrugated sheeting throughout is No. 16 gauge thick, with 5-inch pitch corrugations. At the centre of the roof is a louvre ventilator extending the full length of the building; and on each side of same is a continuous skylight, 7 feet wide, glazed on a puttyless system. For additional ventilation, a number of adjustable ventilators are provided in the sides, just above the discharging stage, with adjustable deflectors to induce an upward current of air.

The gable ends present a large flat area exposed to the direct



Photograph E.—The Old Swansea Retort-Houses being Covered by the New Semi-Circular Building.



PHOTOGRAPH F.—THE NEW SWANSEA RETORT-HOUSE APPROACHING COMPLETION.

force of the wind pressure, especially as the west gable immediately faces Swansea Bay. The large semi-circular openings made in the gables, which can be seen on the photographs, relieve considerably the maximum pressure on these parts, and also afford additional light and ventilation. The framework consists of eight 12 in. by 6 in. rolled steel joist stanchions and two main horizontal girders of 14 in. by 6 in., with 12 in. by $\frac{1}{2}$ in. table plates suitably trussed. The intervening areas are filled in with 5 in. by 3 in. steel joists, to which the sheets are attached. The foundations for the base of each rib consist of a concrete pier 6 feet deep, carried down to ballast level. At the ground line, they were continued in brickwork of 2 ft. 6 in. thickness and finished off with a stone 12 inches thick, on which the base-plate rested. Four holding-down bolts, $2\frac{1}{2}$ inches in diameter, secured the base-plate to the foundations.

The circumstances of erection were unusual, as the contract stipulated that the horizontal beds within the site of the new building, and which were to be eventually displaced by the "slopers" when the latter were working, should be left standing. To achieve this, it was necessary to span these beds with a floored travelling gantry of sufficient width to leave clearance for drawing and charging the retorts. The plan adopted for the erection of the building is clearly shown on Diagram No. 6. The materials, in sections, were brought to the site on rail from the east end, outside the wall of the old retort-house. Then a cross-travelling hoist fixed on the front side of the gantry lifted the girders from the trollies and transported them at high level to the point required, where they were then transferred in mid-air to the derricks, fixed on the upper stage, and lifted into position. As each principal was erected, the corresponding bay was filled in with purlin girders, rafters, purlins, and wind-ties of $1\frac{3}{4}$-inch diameter adjustable steel rods, to form the complete structure. The gantry, being 25 feet wide and floored all over on the upper working platform, formed the necessary protection for the portion of the site over which erection was taking place. Sections of the old roofs Nos. 1 and 2 were removed as required when the gantry was moved forward on its rail track, extending the whole length of the house. This method of erection, although involving necessarily a large outlay, proved itself to be of great service, and offered many facilities for speedy and safe erection; erectors, riveters, sheeters, and painters all working off the upper platform, which permitted also all parts to be under close observation during and after erection.

The inception of the design for this building is due to Mr. Thornton Andrews, the Company's Engineer, who not only originated this method of construction for an inclined retort house building, but under whose personal supervision the designs and details were prepared and the work carried out to a successful completion.

The next example of this description of buildings to which I will refer is illustrated on Diagram No. 7, representing a retort-house fitted up with inclined retorts which we are just completing at the Dartford Gas-Works, Kent. I should mention that the whole of this work has been planned and carried out under the general direction of Mr. Frank Morris, who was so many years Engineer to the Brentford Gas Company, and who has been so intimately and successfully associated with the developing and perfecting the system of inclined retorts.

An installation of inclines was put up under Mr. Morris's direction, in 1894, at Dartford, consisting of four beds of sixes, contained in a brick building; and it was owing to the satisfactory experience with these inclined retorts that it was decided, early in the present year, to do away with the existing principal retort-house, containing nine beds of horizontal settings, and erect on the site the work referred to here. As the horizontals could not be spared till the end of the busy winter season, it was manifest that the new house should be in working order before the commencement of the ensuing winter requirements. Therefore, the time occupied in building the new house was a most important factor, and duly considered when deciding on the steel construction.

The entire works, including the removal of the old house and settings and the complete erection of the new house and its contents, including elevating and conveying plant and all foundation work, was let under one contract in the early part of the year—it being stipulated that the existing retort-house and coal-store should not be disturbed until April, and the new installation be ready for gas-making by the end of September.

These are the special circumstances at Dartford where the adoption of a steel structure was favourable. The buildings were able to be prepared ready for erection without disturbance of the existing work; and it is very doubtful if a brick building could have been erected and roofed in during the short time at disposal. The erection of the new buildings, however, was accomplished, and roofed in, by the time the old house and benches were demolished, and new foundations finished; and thus the new bench has from the first been properly sheltered by the permanent roof from the inclement weather.

The buildings comprise a retort-house 89 ft. 3 in. in length and 48 feet wide, with a height of 46 feet from the ground line to the eaves, containing nine beds of six retorts, Ω-shape, 24 in. by $14\frac{1}{2}$ in. by 20 ft. long, and a coal-store, 89 ft. 3 in. long and 32 ft. wide, parallel with the retort-house. The general construction of the building will be made clear to the members by the Diagram

PHOTOGRAPH G.—INTERIOR OF THE NEW SWANSEA RETORT-HOUSE.

No. 7. The framing is of steel throughout, consisting of ordinary rolled steel joists for vertical members, 14 in. by 6 in. for the lower half, diminished to 10 in. by 6 in. for the upper half, placed at 8 ft. 11 in. centres, braced together with angle steel horizontal bars of 3 in. by 3 in. by $\frac{3}{8}$ in. section, to which the corrugated sheeting is attached. The sheeting used was of No. 14 gauge thickness, ungalvanized, painted with "Ferrodor" paint before leaving the maker's works.

In the coal-store, heavier section purlins were used—namely, 6 in. by $2\frac{1}{2}$ in. by $2\frac{1}{4}$ in. channels, calculated to resist the strain due to the coal pressure against the sheets, which were attached to the channel bars with special bridle bolts. On the side of the coal-store fronting the retort-stack a wall formed of brickwork was substituted for the sheets, and carried up to 3 feet above the discharging floor level, to avoid any risk of trouble arising in the coal-store due to radiation of heat from the retort-benches. Surrounding the entire building a dwarf wall, 18 inches high, was built, to which the corrugated sheeted sides extended.

The question of ventilation is an important one; and this has been provided for by a louvre in the roof and by openings of considerable area on both sides and ends of the building above the charging-stage level—fitted with arrangements for closing when required. Provision is also necessary for the avoidance of injury to the building by reason of the expansion due to the heat of the bench, which, if communicated by the stage-floor girders to the side walls of the structure, would cause distortion. This has been avoided by a patented device, whereby the stage charging girders are supported on expansion rollers, and thus a movement can take place without any strain on the walls. The discharging stage is also supported independently from the bench on cast-iron columns; the intervening space being arranged so that a hot-coke conveyor may be added at a later date. This floor is formed of concrete arches and paved with chequer-bricks.

The hydraulic and foul mains, with their accessories, are suspended from cross joints connecting the tops of the front and back buckstaves. Thus throughout, as far as possible, the bench is free from ironwork and connections. The buckstaves are of heavy section, 16 in. by 6 in. by 6 in. rolled steel joists; the back ones having strengthening table plates, 12 in. by $\frac{3}{8}$ in. riveted on the flanges, and are tied together at the base by a continuous connecting rod embedded in the concrete foundations. The coal-conveying machinery, in addition to supplying the requirements of the new benches, is arranged to deliver, when required, to the conveyor of the existing installation.

The house is of more generous proportions than will be found in many similar installations, affording sufficient height and width to secure proper ventilation and reasonably comfortable working conditions for the men. Though a small saving may be effected in first cost by narrow stages, low roofs, and light construction of the structure, it is an economy that may afterwards be regretted either in one or the other case.

The immediate oversight of the work has been in the able hands of Mr. Rapkin, the Company's Manager, whose constant alert attention and assistance has had not a little to do with the accomplishment of what was desired. The furnaces were fired at the latter end of August; and after the usual period for drying off, the bench will be ready for gas-making by the time stipulated. The contract, although not a very extensive one, still was somewhat complicated, involving the disturbance of many gas connections and the general arrangements of the Gas Company, who, it will be remembered, had to maintain their supply of gas to the consumers without any interruption, although fully 60 per cent. of the coal-gas producing plant was put entirely out of action.

It will be noticed that corrugated sheets form a prominent feature in the construction of the buildings mentioned to-day; and I would like to add a word generally on this point. The thickness of sheeting is an important factor, and should in no case be less than No. 18 gauge, when used for gas-works purposes. But in the two principal structures instanced to-day, it is in one case No. 16 gauge, and in the other No. 14 gauge in thickness. In ordinary circumstances—*i.e.*, for buildings not exposed to great deteriorating influences—No. 18 gauge is used for the best work generally, and No. 16 gauge when extra strength is required.

For estimating the comparative advantages of these different gauges, it is well to take into account that the thicker sheets are not only more durable, but allow the framework supports to be spaced correspondingly further apart. As to durability, good galvanized sheets can only be obtained from the best sheet iron, because if the metal is not properly cleaned and free from cinder, it will not hold the zinc coating. Again, if the metal is not tough and ductile, it will crack when the corrugations are stamped. As these defects render the sheets liable to oxidation, it is essential that proper and rigid inspection should be enforced before the sheets are used; likewise painting at proper intervals after erection. If these points are adhered to, the corrugated sheeted building should answer all the purposes required of it.

In bringing these remarks to a conclusion, I am glad to be able through the kind courtesy of Mr. Edward Drory, the Imperial Continental Gas Association's Chief Engineer at Berlin, to bring

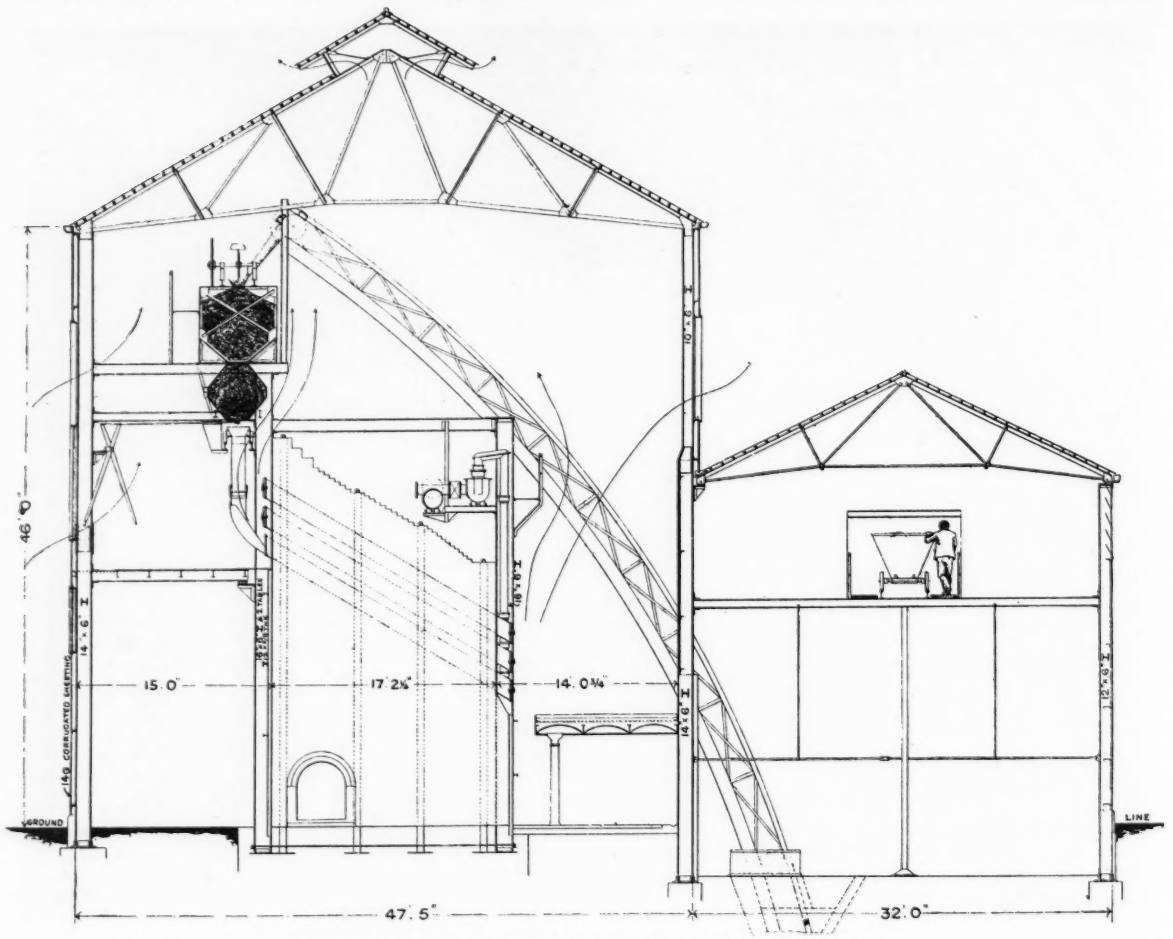



Diagram No. 5.—The Inclined Retort-House at Dartford.

to your notice the two diagrams, which illustrate some most interesting examples of retort-house construction abroad.* The Gitschinerstrasse house was constructed some 33 years ago, ago, and originally contained 41 horizontal beds. In 1897, however, Mr. Drory replaced the horizontals with inclines, and adapted the then existing building without any great structural alterations—the chief alterations consisting of improvements to give better light and ventilation by means of ventilators fixed immediately over the discharging ends of the retorts, and a wide strip of the covering removed, leaving the centre of the house quite open to the air. This arrangement for carrying off the smoke, dust, and vapour gave very satisfactory results; so that a similar scheme was incorporated by Mr. Drory in the design for the new retort-house at Mariendorf, with the object of securing ventilation as perfect as possible without exposing men and plant to wind and weather, and, secondly, to arrange the supports of the stages and coal-hoppers in such a manner that they would be independent of the benches, and thus avoid all chance of derangement consequent upon any movement in the benches due to expansion or other causes.

A feature in these two roofs is that they are covered with wooden boards, about ¾-inch thick, tarred, and then overlaid with tarred felt; and from a personal inspection I made a few days ago of both the roofs, this material appeared to be a very suitable and durable form of covering. The side walls of the Mariendorf house are composed of 4½ inch brick panels built between the steel stanchions. A point to be noted is that the charging-stage is constructed with an elevated platform; the working-stage being high enough to enable the stokers to observe the interior of every retort. The intervening space next the bench is left open for the additional circulation of air. The whole structure, which I had the privilege of seeing, is a unique example of modern retort-house construction, and bears in every detail evidence of very careful thought in its design and execution.

In conclusion, I must apologize for the brief description of the various examples I have given to-day. Details of construction, however, have had to give place to general descriptive matter, owing to limit of time in which to read these notes. I have endeavoured, however, to partially compensate for this necessary brevity by exhibiting several diagrams and photographs, which represent in graphic form the manner in which the several works have been carried out.

* These were the drawings (figs. 2 and 4) published as a supplement to the Journal for June 3, 1903.—Ed. J. G. L.

*Discussion.*

Mr. H. E. Jones (London) said, before mentioning his personal opinions upon the paper, he should like to observe, as coming from outside the Association, that he felt, after having listened to the President's address, it was one that was worthy of the Association, and of the President himself. He had touched a chord that he (Mr. Jones) had often felt himself, when he mentioned that they, as gas engineers, would do well to record their failures as well as their successes. Turning to the paper, he remarked that he thought, with regard to steel structures, that Mr. Cutler must have felt great anxiety during the tremendous gales of the previous Thursday night. (Laughter.) But, as a matter of fact, steel structures were only the natural development of the construction of buildings containing plant working at high temperatures, and with flame and smoke and hot material, though not of so indestructible a nature as masonry. Moreover, such construction lent itself, as Mr. Cutler had well pointed out, to the prompt execution of works which had to be carried out between the time of letting down the retorts at the end of one winter and heating up again for the next winter; and this was a matter that struck closely home to all of them. He could have wished that Mr. Cutler had given them the cost of some of these works, so that they might have compared them, in their own minds, with the costs they were more familiar with in regard to the erection of ordinary retort-houses with brick walls and iron roofs, slated. He thought it was obvious, and Mr. Cutler said as much, that the large circular roof at Swansea must have entailed a great expense. He did not hesitate to say, from his own experience as an Engineer, having observed these methods at railway stations, that their cost must be very considerable; and although it was very attractive to remove all the tie-rods and other things which would make a construction of this kind safe and efficient, it did mean a large amount of metal thrown in to the haunches, which tended to cause distortion by its own weight, unassisted by wind pressure. But it must cost a great deal of money. There were, of course, positions and times when they must disregard costs, and be governed by circumstances; and then this plan of construction might appeal to them. The more frequently they took the support from the ground, by columns, and the more they completely tied the columns together at the heads, and brought the points of stretching of the main bars of their roofs into permanent and efficient tie, the cheaper their work would be. He must say his friend Mr. Frank Morris—he was, by the way, his (Mr. Jones's) father's first pupil, and the only thing he had not converted him to yet was the sloping

retort—had, in the example of steel construction at Dartford to which the author had referred, made, as might have been expected, a cheap and efficient building that came out, he should imagine, very cheaply as compared with the circular construction. The same might be said of the other works referred to. The Southall example was a thorough, effective, and cheap construction. It was not ornamental, and it was not a thing that struck one as magnificent; but it meant economy. Mr. Cutler had given them a paper that was admirably practical, because he had given them particulars of existing and present-day structures. The dimensions and all the details made the paper look somewhat akin to a specification; and this rendered it all the more valuable. It was a novel, and yet a proper, evolution of construction that they should, in buildings containing flame and hot processes, go in for metal. As a rapid construction, the system commended itself very much.

Mr. R. G. SHADBOLT (Grantham), in response to a call from the President, said he had been requested to propose a vote of thanks to the writer of the paper; and he had been reserving himself for that occasion. Perhaps, however, as the President had called upon him, they would allow him to at once propose that the heartiest thanks of the members be accorded to Mr. Cutler for the very useful paper he had submitted to them that day. Of course, there were not many gas engineers in the Eastern Counties who were called upon to superintend the construction of retort-houses such, for instance, as that at Swansea; but he thought that one good thing Mr. Cutler had done in bringing the subject before the members was this (apart, by the way, from showing the utility of their associate members) that whenever they as gas engineers might be placed in the position of being called upon to decide which was the best method of getting over a certain difficulty and making the best of a certain situation, and turning the existing conditions to the best advantage, if they wished for any information as to steel construction in such instances they had only to look to Mr. Cutler's paper, and there they would have an almost complete specification for the very thing they would require. The President had asked for a good discussion. He (Mr. Shadbolt) was afraid they were not going to have it. This was one of those subjects they could not discuss, without having had intimate experience of it; and they could only thank Mr. Cutler for his information, which would be of great value to many of them in the future. But to pretend to discuss it—well they might just as well pretend to discuss the fiscal question. The paper was of great value; and the best they could do was to acknowledge the author's efforts in the heartiest way possible.

Mr. W. D. CHILD (Romford) said he was not going to criticize or discuss the paper; but he would like to say that he was glad to find the idea was becoming more prevalent to use the method of corrugated iron for roof covering in preference to some of the heavier forms of covering that had been adopted. It was his opinion that this method enabled one to reduce the whole cost of a structure by lightening the roof principals and placing them further apart, and thereby effecting a material alteration in the cost of the whole building. Some twelve years ago, he built a new works at Romford; and he then adopted this method of covering the roof with corrugated iron. On that occasion, one of Mr. Cutler's immediate principals did not give him (Mr. Child) any very cheering encouragement—in fact, he said that some fine morning he (Mr. Child) would go into his house and find the roof had disappeared. After twelve years, they had had to replace the covering; but he found that the money that was saved in covering the building with a comparatively light frame principal and corrugated iron was a more economical method than the heavier roof principal covered by slate or some other form of roofing. He begged to differ slightly from Mr. Cutler in one of his expressed opinions, that attention should be paid to the painting of the covering material at intervals. He himself would not spend anything in attempting to preserve the covering after its erection. The difficulty of carrying out painting operations in a retort-house was very considerable; and the work was never properly done. The soot and dirt were never thoroughly cleaned from the under-surface of the material; and the consequence was they might just as well throw the paint on to the ground. The same thing almost applied to the prejudice he had against the form of roof of which the Swansea one was a splendid example. If he had to erect anything approaching this style of building, he would rather adopt the plate-girder system or the steel-joist system shown in the photographs. He had a great objection to lattice-work in retort-houses, or buildings used for similar purposes. It might be useful for a rifle brigade or artillery hall where something ornamental was required; but, where the work was to be subjected to such conditions as obtained in gas-works, then let them have something which could be covered by paint right up to the roof and the rafters. It might be of some advantage to express this view, even though it might be differed from by other members. They had, in the paper, excellent specimens of roof building of all kinds. He took it that it was Mr. Cutler's idea to show that buildings could be constructed self-supporting, with steel framing, with the brickwork, boarding, sheeting, or anything else, simply forming a panelling.

Mr. E. G. SMITHARD (King's Lynn) seconded the vote of thanks proposed by Mr. Shadbolt, and observed that the members were very much indebted to Mr. Cutler for having come forward and given them his views on a subject in which his experience was quite unique. He agreed with one of the previous speakers that, if Mr. Cutler could give them some idea of the cost of building and the dimensions of any one example—especially the one at Dartford—it would add a good deal of interest to the paper. The members were indeed greatly indebted to him for having come forward, and giving them the benefit of his large experience.

The PRESIDENT, in concluding the discussion, said the paper was a most valuable one, because when they turned to their transactions and looked at the illustrations of the various drawings and designs, they would generally find something that would be useful to them. It did not frequently happen that the gas managers of the Eastern Counties had to design anything like the beautiful semi-circular roof which had been put up at Swansea; but it was a pity—and here he agreed with Mr. Smithard—that they had not the comparative costs. He had not the slightest doubt that the Swansea roof was an expensive one; but if Mr. Cutler, in replying, could supply them with any particulars as to the cost of the examples of roofs he had given, or any one of them, it would add greatly to the utility of the paper.

Mr. CUTLER, in reply, said he was much obliged to the members for the way in which they had received the paper, and also for the remarks several gentlemen had made with reference to it. He had to thank Mr. Jones for the kind manner in which he had supported the design of the structures dealt with; and he certainly thought that the subject deserved more attention in connection with the modern methods of gas production, and that the use of steel would eventually replace the massive brick buildings they sometimes saw in gas-works. With regard to the cost, he did not intend in the paper to take up the question of the comparison of cost between brick and steel buildings, because so much depended upon the individual circumstances of the two forms of structures to be compared; but he could quite understand how important a point it must be to the members. A good deal had been said with regard to what was apparently the very expensive construction of the Swansea roof. He might say that the job cost less than £8000, and that this included the complete erection and fitting up of the building, which would contain 24 beds of eight retorts, or 192 retorts in all. When the members came to compare this (which they were better able to do than he was himself) with the utilization of the special conditions of their sites, foundations, and other matters incidental thereto, he thought they would find that the cost complete was not higher than that of a brick building; in fact, he believed it was a cheaper design. For a retort-house of this width—to give the width of charging and discharging stages and the same height—it would be found, in any comparison, that the cost did not come out so excessive after all. He would be pleased to give the members another case—the building of the water-gas plant house at Mitcham. The contract for the complete erection of the building there came out to about £2250. It must be remembered that this building was 112 feet long, and contained three rooms—the generator-house, the engine-room, and the boiler-house, with a store above the engine-room, made in concrete, and supported on heavy girders, the same as in the case of the Southall building. He could also give the cost of the Southall construction, which was seen in the photograph (p. 741). The total outlay for the building was rather less than £3000. But it must be taken into consideration that this did not include the sheeting of the building on the sides, though it did on the gable ends; nor did it include the slating of the roof. But the members would be able to estimate these things very well for themselves, and so arrive at the total cost of the building. This was a plain, straightforward job of simple construction. The house would contain 25 beds of sixes—equal to 150 retorts in all. He had hoped there would have been some little discussion on the question of using corrugated sheets. The members would notice that the whole of the buildings he had brought before them had this distinctive feature. There was no doubt that the competition which had prevailed in the corrugated sheet-iron trade during the last twenty years, and the tendency to judge everything by the standard of price alone, had resulted in the production of a very cheap inferior quality of sheets; and there was not the least doubt that this was the cause of the disfavour in which these sheets were now held by some people. There were several first-class makers of corrugated sheets in the country; and if proper inspection was carried out, there was not the least doubt that they could get a good sheet which would stand a very long time. If the sheet was not properly cleaned before it was coated with zinc, and if the material was not of good quality, it would crack when corrugated; and as soon as any little fractures were exposed to the air, oxidation would take place, and the sheet was then practically destroyed. He did not think any other question had been raised, but he might just mention an instance showing the durability of galvanized corrugated sheeting. Among the other photographs, there was one taken of the old Swansea buildings (p. 745); and it would be noticed that the new large building covered the two small circular roofs. These were erected in 1868; and it was only now that they had taken these old buildings down, and put up the new building for the inclined retort-settings. So that these sheets had practically lasted as long as this method of gas production had done. Mr. Child had make a remark about the painting. He was sorry he could not quite agree with him. If the sheets were painted when the job was erected, and then left until they were worn out, he (Mr. Cutler) did not think the treatment altogether coincided with his views. With a periodical painting (say) once in about four years, the sheets would last—

well, for twenty or even twenty-five years, as they had done, and longer, in the case of the Swansea retort-houses.

Mr. ALEX. MITCHELL (Bury St. Edmunds) said he should like to ask Mr. Cutler whether he did not think that the sheets were better without being galvanized. It was his own experience that they would be a great deal better if they were not galvanized at all. He was under the impression that the little sulphuric acid generated in the retort-house—especially where the coke was quenched inside—attacked the galvanizing on the sheets, and the oxidation was more rapid than if the sheets were ungalvanized.

Mr. CUTLER replied that no doubt it was the opinion of some engineers that ungalvanized sheets should be used. In the Dartford job, for example, the sheets were 14 gauge thickness, and not galvanized. In the Southall building, too, the sheets were put up ungalvanized. But, at the same time, if he was called upon to express an opinion, he did think, from what he had seen lately, that it was better to use galvanized sheets, and then not to paint them immediately they were put up. The best thing was to allow the sheets to be exposed to the weather for a time, to get the gloss off the surface, and then to paint them.

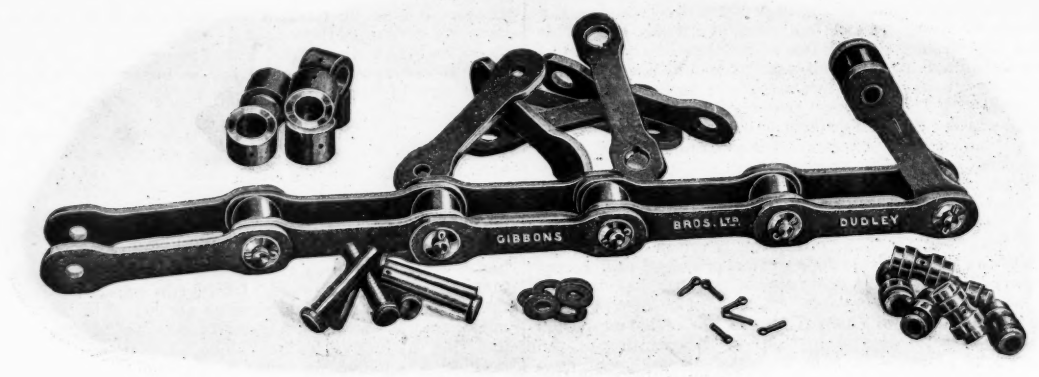
Mr. MITCHELL said he was perfectly satisfied galvanizing was a good thing to do—outside, but not inside, the retort-house.

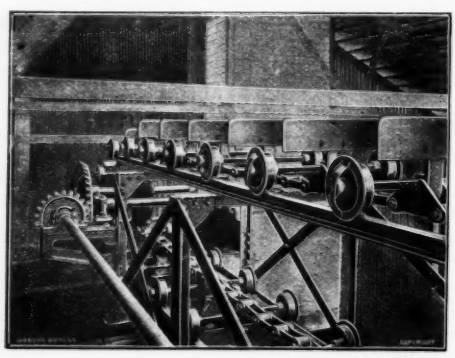
Mr. H. WIMHURST (Sleaford) said, as to Mr. Mitchell's experience, he might mention that they had a new retort-house built about nine years ago and some portions of the roof had shown signs of decay this summer. He had replaced the section which was most decayed with ungalvanized sheets of No. 16 gauge. He had had it backed, and treated with two coats of Imperial black varnish. He had an idea that these sheets would stand much longer than the galvanized ones.

Mr. CUTLER: I hope you will let me know what your experience is after the sheets have been up some little time.

## GIBBONS'S PATENT ROLLER CHAINS FOR CONVEYORS AND ELEVATORS.

Users of conveyors and elevators know without the telling that there is no part of these structures upon which so much depends as the chain; and, in view of this fact, it is most useful for them to be made acquainted with the details of anything in this line that is offered to them as an improvement, and especially when it has been proved. In work which they have lately been carrying out, Messrs. Gibbons Bros., of Dudley, have been using extensively their patent steel roller chain; and they inform us that it is giving much satisfaction to those who have adopted it. It is now being employed in connection with



all the heavier types of elevators and conveyors made by the firm; and the general experience is reported to be that the machinery fitted with it runs much more smoothly than with the old type of stamped and riveted chains, and that, in consequence of the design and method of construction, the wear on the various parts is practically *nil*.

With such excellent commendation, interest will be taken in the construction of the chain. The illustration of a small section, with the separate parts, represents the standard size for push-plate conveyors and large elevators. It is 6·6 inches from centre to centre of the connecting pins; three links making a standard unit of 20 inches—this being the distance apart of the push-plates or the buckets. Some time since, Messrs. Gibbons Bros. put down an extensive plant of automatic milling machines, lathes, &c., with the objects, first, of producing a chain which would be a thoroughly good mechanical job at a low cost, and, secondly, of doing away with punching or shearing, to ensure that the material when finished should retain its original strength, and that every part of the chain should be readily interchangeable. The links are milled to the shape depicted in the illustration in bundles o eighteen at a time; and the pins and the in ner and outer bushes are turned out of solid bars of steel.

A special feature of the chain is the recess turned on the outer periphery of the inner bush, which, together with the outer bush, forms a receptacle for solid lubricant, which is poured in hot through a plug-hole in the outer bush, and reaches the pin through a small hole in the inner bush. The inner bushes pass through the inner pair of links, and are keyed to them; and the pins are keyed to the outer links—thus distributing the pressure evenly on the bearing surfaces. The outer bush, too, is free to revolve, and works against the teeth of the driving-wheels.

It has been proved by a test made by Messrs. D. Kirkcaldy and Son that this chain is capable of working at a strain of more than 6000 lbs. The chain is also made in several smaller sizes both for driving purposes, and for lighter elevators and conveyors.

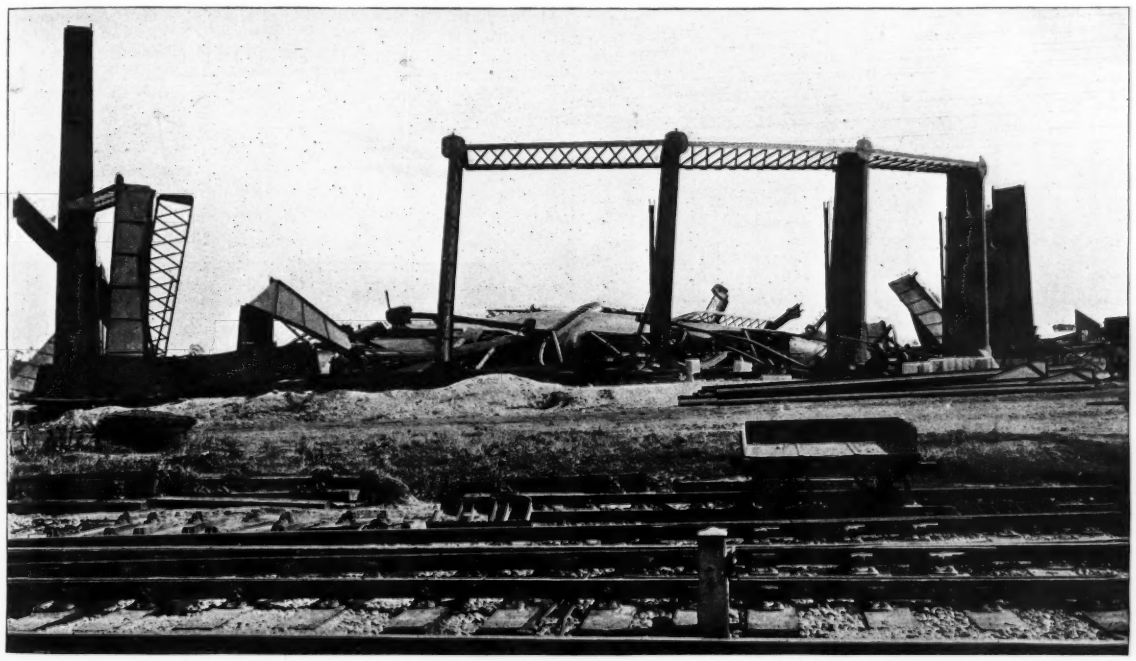
The smaller illustration shows Gibbons's push-plate conveyor, fitted with the chain described. This type of conveyor has now been at work in various places for the past two years; and it is naturally a matter of some pride with the makers that they are able to say there has not been the slightest trouble with any installation since it started to work. A special, and rather interesting, feature of the conveyor is that, when fixed over the top of hoppers feeding inclined retorts as illustrated, the trough is constructed without a bottom plate; and this avoids the necessity of having a man to attend to the sliding-doors, as usully provided. The coal simply falls through the trough until it reaches the level of its bottom; and then all subsequent delivery of coal is carried along on the top of that previously deposited in the hoppers. The advantages claimed for this are that it does away with the "screeching" so common to this class of conveyor, and prevents any chance of lumps of coal getting wedged between the push-plates and the bottom of the trough, and thereby producing the straining of both the chain and the push-plates. The conveyors being always fitted with self-lubricating side wheels, the driving power is also minimized, and the working rendered practically noiseless. A number of large elevating and conveying plants on the principle described are being constructed by Messrs. Gibbons Bros. at the present time

An International Exhibition of Inventions is to be held at Brighton in November next. The object is to afford inventors and patentees an opportunity of bringing their inventions under the notice of capitalists, manufacturers, and users. Awards of gold, silver, and bronze medals will be made for inventions possessing the greatest merit combined with commercial utility.

The marriage was solemnized at the Parish Church of St. Michael and All Saints, Wigan, on the 8th inst., of Mr. L. B. Taylor, representative of Messrs. J. & J. Braddock, Oldham, and Miss E. M. Timmins, daughter of Mr. Joseph Timmins, M.Inst.C.E., Engineer and Manager of the Wigan Corporation Gas-Works. Among the presents received were a handsome silver tea service, with an illuminated address, from the Bridegroom's Directors, and a silver and cut-glass tantalus from his colleagues.

## THE WRECK OF THE PORTSMOUTH HOLDER.

Where gas engineers have assembled during the past week, one of the main topics of conversation has been the unfortunate wrecking, in the vehement gale of last Thursday week, of the large holder which was being constructed for the Portsea Island Gas Company. Several gas engineers down south have been to view the wreck, or have passed it by in railway trains. The scene, they say, defies description. The holder is crumpled up and battered by the falling ironwork beyond recognition; and standards, which look capable of meeting any strain, are bent into odd shapes, as though they were merely composed of lead. The holder was being erected in a very exposed position; and it had to meet the full force of this devastating gale at a most unfortunate stage of its construction. This is the whole secret of the catastrophe. The tempest was one of those unexpected occurrences that came with a suddenness that gave no time for taking any great precautions to ensure the safety of the unfinished structure. Had the work been completed, the holder would have been standing as strong and erect to-day as the thousands of other holders in the kingdom. A few weeks hence and all would have been well, even in a stronger gale. Much sympathy will be felt for Mr. J. S. Ashworth, the Company's Engineer (who, it is understood, designed the holder), and for the Contractors, Messrs. C. & W. Walker. There has been some discussion in engineering circles as to who will be responsible for the loss. That it will be a substantial loss a glance at the photograph of the wreck will show; but from what we hear there does not appear to be any likelihood of any question being raised over this matter as between Messrs. Walker and the Gas Company. As to the exact points reached in the construction of the framing and the sheeting of the holder, there is much contradictory rumour abroad; and it is only fair to the Contractors that little heed should be paid to this by gas engineers.



## NOTES ON GAS PURIFICATION.

By Dr. H. Bunte.

(*Continued from p.* 676.)

The inconvenient phenomena of rise of temperature in the vessels, drying and caking together of the oxide, and the deposition of water, become the more troublesome the greater is the proportion of sulphuretted hydrogen in the crude gas, or, broadly, the richer in sulphur is the coal carbonized. It is therefore worth much to use gas coal which contains but little sulphur. It has hitherto, for simplicity, been assumed that the gas for purification contains an average of 1 volume per cent. of sulphuretted hydrogen. If the proportion, however, is lower in particular cases, the heat evolved, and the resultant phenomena, will naturally be restricted; while they will be intensified by a higher proportion of sulphuretted hydrogen in the crude gas consequent on the use of coal containing a lot of sulphur. How great the differences due to the quality of the coal may actually be, has been clearly demonstrated by researches made by Herren Schmidt and Witzeck, of which the results are shown graphically in the diagram on p. 750.

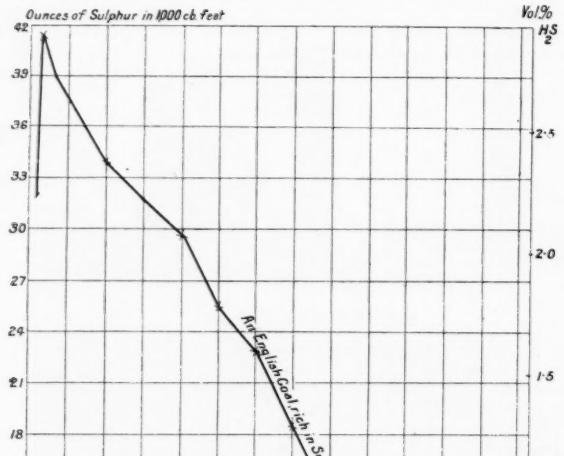
The proportion of sulphuretted hydrogen in the crude gas is well known to vary very much with one and the same coal in the course of the distillation. It will be seen from the diagram that with an English coal containing a lot of sulphur, the amount in the crude gas rises at the beginning of the distillation to as much as 2·9 volumes per cent., and then sinks to 1 volume per cent., and less, towards the close of the distillation. Similar, though smaller, differences are shown in the case of a coal containing but little sulphur. When all the sulphuretted hydrogen has to be absorbed by oxide, and the resulting sulphide of iron revivified by air being added to the gas, the supply of air need not be varied according to these fluctuations in the proportion of sulphuretted hydrogen in the crude gas. It is sufficient to maintain the air supply continuously at the amount corresponding with the average proportion of sulphuretted hydrogen in the gas, as the oxide adapts itself to meet the fluctuations. Actually, it is best to add rather less air to the gas than corresponds with the average proportion of sulphuretted hydrogen present, because, even with the theoretical air supply, some sulphide of iron persists in the material and escapes revivification. This is due to the fact that fouling occurs more rapidly than revivification, more especially if the material is dry. Consequently, if air is added in proportion to the sulphuretted hydrogen, some oxygen will pass through the material unabsorbed. Therefore rather less than the theoretical proportion of air should be admitted to the gas. Theory indicates that 1 volume of sulphuretted hydrogen requires $\frac{1}{2}$ volume of oxygen, or about $2\frac{1}{2}$ volumes of air.

Opinions are divided as to where in the train of apparatus the air should be admitted to the gas. It is advocated, on the one hand, that the best place is anterior to the condensers, in order that the air may retain hydrocarbons which otherwise would be separated with the tar, and that by this mode of self-carburetting diminution of illuminating power in consequence of the admixture of air may be avoided. On the other hand, the presence of oxygen is said to favour rusting of the iron apparatus, and the formation of sulphocyanide at the expense of the more valuable cyanogen compounds in the washers. The utility of any cyanogen recovery process is thus considerably diminished, and consequently it should be best not to admit the air until after the gas has passed all the washing and scrubbing apparatus. Further careful experiments are needed to clear up these points.

Dr. Funk, of Charlottenburg, has directed attention to another trouble which he says arises when there is a great rise of temperature—viz., the formation of carbon oxysulphide or carbonyl sulphide from the carbonic oxide of the gas and the sulphur in dry oxide—thus $CO + S = COS$. The carbon oxysulphide decomposes on contact with water, into carbonic acid and sulphuretted hydrogen—thus $COS + H_2O = CO_2 + H_2S$. The gas issuing directly from the purifier will therefore not stain lead paper, although it contains carbon oxysulphide; and will appear thoroughly well purified. Nevertheless when later it has come in contact with water, sulphuretted hydrogen will have been formed by the decomposition of the carbon oxysulphide, and lead paper will be blackened by the gas, which will thus no longer pass as clean. Similar cases of purified gas subsequently giving the reaction for sulphuretted hydrogen are common, and are generally traced to other causes. There have been some vigorous

discussions in England about them. Dr. Funk's explanation and researches appear unexceptionable; yet the author was unable to obtain experimental confirmation of the formation of carbon oxysulphide when gas was passed over dry oxide containing a lot of sulphur, in his laboratory, so long as the temperature did not exceed 100° C.

Carbonic acid is an important impurity of coal gas. It is detrimental to the illuminating power when the gas is burnt in flat-flame and argand burners, because the carbon in the flame reduces it to carbonic oxide, with absorption of heat and consequent reduction of the temperature of the flame. The flame is thereby partially disillumined. It is generally reckoned that 1 per cent. of carbonic acid in coal gas reduces the illuminating power in flat-flame burners by 1 candle. Consequently the removal of carbonic acid from gas was a problem of great importance so long as gas lighting was limited to the use of flat-flame and argand burners. In 1875, Dr. Oechelhaeuser induced the German Association of Gas and Water Engineers to offer a prize for the best method of removing carbonic acid from illuminating gas; but the prize has never been awarded, because it has been found that it is generally more advantageous to secure the required illuminating power by enrichment than by the removal of carbonic acid. Only in England—and in London in particular—is carbonic acid still, at great sacrifices, removed from the gas, as this is necessary for keeping down the sulphur compounds in the purified gas to




THE COURSE OF EVOLUTION OF SULPHURETTED HYDROGEN AND CARBON BISULPHIDE IN THE DISTILLATION OF COALS CONTAINING A LITTLE AND A LOT OF SULPHUR.

20 grains per 100 cubic feet, as is required there by prescription. As, however, flat-flame and argand burners have been almost wholly superseded for about ten years past by the Welsbach burner, the amount of carbonic acid in the gas has become entirely immaterial, because the gas is now not merely disillumined in the bunsen burner, but is further partially burnt by the previous ample admixture of air before it raises the Welsbach mantle to incandescence.

The small amount of carbonic acid naturally present in coal gas (which even when coals of recent formation are carbonized scarcely exceeds $2\frac{1}{2}$ per cent.), no longer plays an important rôle. Clearly the carbonic acid, like any other indifferent gas, such as nitrogen, diminishes the heating value of the coal gas; but the diminution comes within very small limits, and in the practical application of the gas is not noticeable. Indeed, the case may occur of the illuminating power in the Welsbach burner being increased by admixture of carbonic acid, or becoming less when carbonic acid is removed. The question of the effect of the carbonic acid on the lighting value of the gas in the Welsbach burner does not, with coal gas, assume any importance. It becomes important, however, when mixed gas is produced by means of simple water gas, as the proportion of carbonic acid in the latter is considerably greater in most cases than it is in coal gas.

The author therefore induced one of his pupils to investigate this question more closely in the laboratory. A remarkable result was obtained. With an ordinary Welsbach burner, a gas containing 3·9 per cent. of carbonic acid gave a light of 74 Hefners (= 65 candles); while the same gas, after the carbonic acid had been removed by soda lime, gave, under precisely similar conditions in other respects, a light of only $64\frac{1}{2}$ Hefners (= $56\frac{1}{2}$ candles). Thus the removal of the carbonic acid was attended by a considerable falling off in the illuminating power. This apparently paradoxical occurrence is naturally explained by the illuminating effect in the Welsbach burner being largely dependent on the regulation of the air supply in the bunsen burner. The more liberal is the air supply at the nipple, the more favourably, *cæteris paribus*, does the combustion take place in the interior of the mantle, and the greater is the illuminating power, If therefore the air inflow at the base of the bunsen burner is not regulated, a gas containing carbonic acid will be more liberally mixed with oxygen than would a gas free from carbonic acid under precisely similar conditions. In the first case, the carbonic acid has, like the oxygen of the air, a disillumining effect; and the combustion of the gas containing carbonic acid consequently takes place under more favourable conditions than that of the gas which is free from it. The former gas thus yields more light than the latter. As, however, in the practical use of the incandescent gaslight exact regulating of the burner cannot be effected and maintained with the same attention as in the laboratory, it follows, from the example quoted above, that other factors, which need not here be referred to in detail, exert far greater effect on the light produced than does the amount of carbonic acid in the gas. The proportion of carbonic acid present may fluctuate within tolerably wide limits, without appreciably affecting the use of the gas for incandescent lighting. The same thing naturally is true with regard to the employment of the gas for heating purposes, as the carbonic acid acts purely as a diluent, and presents no further disadvantages.

*(To be continued.)*

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**Flexible Pipe-Joint.**—A flexible pipe-joint for low-pressure water-mains is described in a paper recently issued by the United States Geological Survey. The joints were used to provide for expansion in 12 to 18 inch pipes-lines conveying the water of an irrigation ditch across streams which intersected its line. After the ends of the pipes, which seem to have been of the bell-and-spigot type, were brought together, several inches of each pipe near the joint were thickly coated with North Carolina tar, over which heavy canvas was wrapped, and a second layer of tar applied. The joint was then finished by wrapping with canvas, which was securely wired on.

**Labour Statistics 1901-2.**—We have received from Mr. H. Llewellyn Smith, the Deputy Controller-General of the Commercial, Labour, and Statistical Department of the Board of Trade, the ninth annual "Abstract of Labour Statistics of the United Kingdom," embracing the year 1901-2. The statistical tables, of which there are nine sets, occupying 225 pages, are preceded by a general summary of the more important figures in the abstract of statistics relating to the conditions of labour in the years 1900-2. In the table relating to Trade Unions, the membership of the National Union of Gas Workers and General Labourers is shown to have decreased from 48,030 in 1899, to 46,014 in 1901, and the income to have risen from £20,553 to £24,275. There were 72 profit-sharing schemes known to be in operation on June 30, 1902; five being in gas and tar-distilling works.

**Production of Dye-Stuff from Naphthalene.**—The Badische Anilin und Soda Fabrik, of Ludwigshafen, have patented a process for the production of a blue-black dye-stuff from naphthalene. The intermediate product obtained by the reduction of 1·8-dinitronaphthalene in concentrated sulphuric acid, which has itself no appreciable tinctorial properties, is converted, by treatment with sodium hydrosulphite in dilute sulphuric or other mineral acid solution, into a violet crystalline dye-stuff, dyeing unmordanted wool in violet shades, passing, on subsequent chroming, to greenish-black, and chromed wool in blue-black shades. The dye-stuff behaves like a leucothiosulphonic acid. It is oxidized by treatment with boiling water, and dissolves in caustic soda to a green liquid, turning blue in the air. On heating with sodium bisulphite, it is changed to a compound soluble in water with a brown colour, which can be printed on cotton in presence of chromium acetate, producing green-black shades.

**Well-Preserved Water-Mains.**—In the course of last year, a water-main was removed from the subsoil of Paris, after having been 25 years therein, and found to be in a perfect state of preservation. Another instance of the inoxidizability of cast iron recently occurred at the Chaillot fire station in the Place d'Alma. The building, which was on the site of the first works constructed to supply the city with water, had to be taken down; and in the course of the operations the intake from the Seine, consisting of a large hooped cast-iron main, was discovered. Being no longer required, it was raised from the bed of the river, and broken up. When the shells and other matter adhering to the outside had been removed, the inscription was perfectly legible: "Creusot, An. 10"—corresponding to the year 1802. A close inspection of the pipe showed that the metal was of excellent quality—a grey charcoal-furnace iron, the fractures of which were as clear as though it had just come from the foundry. There was no trace of decomposition either inside or outside the pipe, though it had been in the water for nearly a century.

# THE BRITISH ASSOCIATION MEETING.

In our "Editorial Notes" last week, reference was made to the address of Sir Norman Lockyer on the opening of the annual meeting of the British Association at Southport. We now give some extracts from the general proceedings.

### The Everlasting Production of Heat.

In the course of his address as President of the Mathematical and Physical Science Section, Professor Charles Vernon Boys, F.R.S., referred to the above matter. He said that of all the events of last year, one stood out beyond all others, not only for its intrinsic importance and revolutionary possibilities, but for the excitement that it had raised among the general public. The discovery by Professor and Madame Curie of what seemed to be the everlasting production of heat in easily measurable quantity by a minute amount of a radium compound was so amazing that, even now that many of them had had the opportunity of seeing with their own eyes the heated thermometer, they were hardly able to believe what they saw. This, which could barely be distinguished from the discovery of perpetual motion, which it was an axiom of science to call impossible, had left every chemist and physicist in a state of bewilderment. Added to this, Sir William Crookes had devised an experiment in which a particle of radium kept a screen bombarbed for ever—so it seemed—each collision producing a microscopic flash of light, the dancing and multitude of which forcibly compelled the imagination to follow the reasoning faculties, and realize the existence of atomic tumult. Thanks to the industry and genius of J. J. Thomson, Rutherford and Soddy, Sir William and Lady Huggins, Dewar and Ramsay, and others in this country, besides Professor and Madame Curie and a host of others abroad, this mystery was being attacked, and theories were being invented to account for the marvellous results of observation. But the theories themselves would a few years ago have seemed more wonderful and incredible than the facts, as they believed them to be, did to-day. An atom of radium could constantly produce an emanation that was something like a gas, which escaped and carried with it wonderful properties; but the atom—the thing which could not be divided—remained and retained its weight. The emanation was truly wonderful. It was self-luminous; it was condensed by extreme cold and vaporized again; and it could be watched as it oozed through stopcocks or hurried through tubes. But in amount it was so small that it had not yet been weighed.

### Municipal Sinking Funds.

In the Economic Science Section, Mr. Stanley H. Turner, M.A., of the Glasgow University, dealt with the subject of "Depreciation and Sinking Funds in Municipal Undertakings." The author said the question to be raised centred about the fact that all municipal undertakings were started with borrowed capital, which must be repaid within statutory periods, and that therefore it was important to understand how this initial burden should be distributed as between the present and the future. Usually, in reproductive undertakings, the sinking fund was based upon the life of the subject, and beyond this there was, in general, no obligation to provide reserves. No decisive answer had at any time been given to the question whether depreciation funds should be kept, with the result that municipalities differed very widely in their methods. A few had adequate depreciation funds, whereas others had either inadequate ones or none at all. According to the latest returns, the annual average depreciation fund for municipal tramways in England and Wales was only just over ½ per cent. on the amount of capital borrowed, and tramways showed the largest percentage of any municipal industry. It was urged by those municipalities which had no depreciation fund that the sinking fund, being based upon the life of the subject, was the depreciation fund, and that if the loan was entirely repaid when the plant was worn out or obsolete, the present had done all that was necessary. Their successors must borrow to reinstate the works. The only alternative, as the law now stood, was to have a depreciation fund in addition; and if this were a true depreciation fund, it would be too great a burden upon the first generation, since the life of the subject was taken into account twice over. Those municipalities which voluntarily laid aside a full depreciation fund, urged that when once an undertaking was started its value should be maintained, as in a private company working a similar undertaking, and that the sinking fund was an extra requirement enforced by Parliament because it was deemed undesirable to allow any permanent local debt. While this second view recommended itself as the sounder finance for reproductive undertakings, there were serious objections to it so long as the sinking fund was fixed on the present principles. The first generation was burdened twice as much as the second and succeeding ones. It not only repaid the whole debt, but also built up an equal capital for future generations, who would have no sinking fund to pay because their capital was no longer borrowed. The difficulty arose because the statutory requirements, which contemplated none of the recent extensions of municipal activity, were not suited to some of the present undertakings; and in these cases a depreciation fund should be made obligatory, while the sinking fund should be entirely dissociated from the life of the subject.

### Natural Gas in Sussex.

Mr. R. Pearson, in a paper on "Natural Gas in Sussex," reviewed the circumstances attending the discovery of the gas, and recounted the steps taken at various times since to turn it to practical uses. It was, however, only recently that the matter had been taken in hand vigorously. Borings were being made over 200 square miles in Sussex. At Heathfield, from 70 to 80 houses were using natural gas for lighting and heating, and it was burnt in street lamps. Gas-engines were also being driven by it. The composition of the gas was given, and the geological conditions of its occurrence were discussed. The author concluded that if it could be proved that there was a huge gasfield lying under the whole of the Weald of Sussex, it would revolutionize the industrial life of the South of England. Iron and sand were there, and both could be worked with fuel on the spot. An enormous tract of country, at present devoted to agriculture, would be opened up to new industries.

### Gas-Engine Explosion.

In the Engineering Section, Mr. H. E. Wimperis, B.A., Assoc. M.Inst.C.E., presented a note on the above subject, in continuation of his paper at the Belfast meeting last year. It was the object of that paper to show that the results of the experiments made by Mr. Dugald Clerk on explosive mixtures of coal gas and air contained in a closed pistonless cylinder could be reconciled with what would be expected to follow from calculations based upon the known properties of the substances employed. For many years it had been a mystery what became of the heat energy liberated on explosion, and many calculations were given showing that only about 50 per cent. of the total energy known to be liberated was accounted for in the pressure and temperature produced in the gas. In discussions upon this subject, another set of experiments was generally quoted—those of Mr. Grover; and in his note the author endeavoured to see what could be made of them. He exhibited a diagram showing that the pressures recorded by the two gentlemen were far from being in agreement. In his two communications Mr. Wimperis attempted to bring into line with modern knowledge these inconsistent results. He considers that the time has come for variable specific heats to be employed; and he says it may be greatly doubted whether any calculations or curves put before the world at present can be regarded as of value, unless there is at least given an alternative calculation founded on the basis of a variable specific heat.

### Bacteriology and Water Examination.

The address delivered by Mr. Charles Hawksley, as President of the Engineering Section, dealt, among other things, with the subject of water supply, with which his name and that of his father have so long been associated. In the course thereof, he made the following remarks: "The advances in recent years in chemical science, and the application of the science of bacteriology to the examination of water, have led to the condemnation of waters which a few years ago would have been deemed to be perfectly suitable for a town supply. While fully appreciating the advantages to be derived from the most careful examination of water supplied for domestic consumption, I cannot but think that we are sometimes unnecessarily alarmed by the results obtained. Taking a broad view of the subject, and looking to the healthy conditions of towns which have for many years been supplied with water from sources now regarded with suspicion, I venture to think that the teachings of chemistry and bacteriology are as yet but imperfectly understood, and that in the future it will be found that some waters now considered of doubtful character are perfectly good and wholesome. I am well aware that the expression of these views may call forth the indignation of some of my friends among eminent chemists and bacteriologists to whose opinions on such subjects I feel bound to pay deference. A Royal Commission has recently recommended that a Government Department should be established and endowed with enormous powers of interference with the action and discretion of the bodies entrusted by Parliament with the responsibility of the administration of water supplies, and it behoves those bodies to give careful consideration to that recommendation, and to take such steps as may be necessary to check any attempt to give effect to a proposal which may result in committing them to the carrying out of unreasonable requirements, possibly involving needless expenditure, at the bidding of a department from whose dictum they may have no appeal."

### The Water of South-West Lancashire.

The above subject was dealt with in two papers read in the Engineering Section—one by Mr. Joseph Parry, M.Inst.C.E., the Water Engineer of the Liverpool Corporation, and the other by Professor J. Campbell Brown, the Public Analyst of the city.

Mr. Parry began by pointing out that the division of Lancashire with which he purposed dealing lay partly in the watershed of the Mersey and partly in that of the Ribble; and the principal rivers having their rise in the division were, he said, the Alt, the Douglas, and the Sansby Brook, all of which were polluted almost to their very source. The problem of supplying the inhabitants with water presented difficulties arising from the physical features of the area; and it was interesting and instructive to see how it had been solved. Wherever the new red sandstone had been found at the surface, the people had at first very little difficulty

in obtaining a sufficient and wholesome supply of water, either from the springs or the wells in that formation; but it had in some cases been found inadequate and unsuitable. At one time, Liverpool was entirely supplied from the sandstone; and the Corporation had had, in and around the city, nine or ten deep wells with numerous headings and boreholes. Three still remained in partial use; but six had been abandoned as the density of the population had increased. Those still in existence were used for high-level residential districts, and in cases of the stoppage of the big aqueducts. The nearest gathering-ground capable of yielding a large supply of the best quality of water by gravitation lay between Bolton and Blackburn—an area of 10,000 acres of hilly, thinly-inhabitated upland country on the millstone grit formation, rising to a maximum elevation of 1500 feet above the level of the sea. This fine source of supply was secured by Liverpool, under the advice of the late Mr. Thomas Hawksley, in the year 1847. The Rivington works then carried out by Mr. Hawksley remained to-day a splendid monument to his foresight and skill as an engineer. The aqueduct from Rivington passed through the heart of South-West Lancashire; and, though under no statutary obligation, Liverpool had always acted in a liberal and unselfish spirit towards places requiring water along the line. The towns and villages actually supplied from the aqueduct in bulk between Rivington and Liverpool included Standish, Aspull, Hindley, Leigh, Ashton, Haydock, Abram, Lowton, and Ince.

Professor Brown's paper was on the nature and quality of the potable waters in the division. He said they were of three kinds: 1) Surface waters, (2) deep well or bore waters, and (3) shallow well or spring waters. The earliest of the first class was the Rivington supply; and though this water had been in daily use for 46 years, no complete analysis had been made by anybody until a full one was made by himself about a month ago. It was interesting to compare the figures with those of an analysis of the Vyrnwy supply, made for the Corporation of Liverpool in 1898. The Rivington water was slightly coloured, and contained a small quantity of organic compounds of iron, to which the colour was generally due. Although the two waters were so much alike, there was none of the development of iron organisms in the Rivington which was so common in Welsh water like that of the Vyrnwy. It was excellent water for domestic use, and was likely to remain so now that Liverpool had the power to repress the pollution of the watershed by dwelling-houses, inns, and farms. Good examples of Lancashire catchment waters were those supplying Preston. The head waters of most of the Lancashire rivers were also of good quality; but by the time they reached the south-western division of the county they had received so much pollution, both from human dwellings and manufactories, that it was impossible to use them. Until recently, Liverpool was supplied to a great extent from deep wells and bores in the sandstone. The rock was becoming gradually saturated with the partly oxidized waste water of the sewers and the streets, and the wells were one after another falling into disuse. In small places deep wells were still the best kind of supply. As typical examples of good deep-bore water from the Keuper sandstone of Lancashire, two wells supplying Widnes might be mentioned. From a deep well in the Ormskirk district, much lime and magnesia were found in all the waters. With regard to the shallow wells—those less than 32 feet in depth—which were still the chief source of supply in country places, their water varied greatly in composition and was usually unfit for domestic use. A well must not, however, be assumed to be bad because it was shallow. Those which yielded good potable water had generally but small quantities of solids in solution.

The author went on to say that attention was first directed to the occurrence of deposit formed by iron organisms in potable waters in Lancashire in the winter of 1890-1, when decomposed vegetable masses and strings of bacteria—in their earlier forms nearly colourless, and in their older state strongly tinged by ferric oxide—were observed in water coming from the deep bore of the Bootle well belonging to the Corporation of Liverpool. These ferruginous strings were reported at the time to be tangled masses enclosing in their meshes particles of sand and filaments. They had no effect at all on the health; but they were unsightly, and therefore required investigation and repression. They were traced as far as 700 feet down the 1300-feet Bootle bore. At this point they were being carried up by the rush of water from a greater depth, and were in a living state, capable of being kept alive in the laboratory. They were not found in the 700-feet bore adjoining, nor in any of the 16 other bores of less depth, though they grew freely on stones in the mixed water from all the bores. The occurrence of these organisms in the well water was successfully checked by plugging the deep bore, The multiplication of the organisms really depended upon the presence of an organic compound of iron with an acid reaction in the water in which they flourished. The next occasion on which organisms were observed was in 1892, in water from agricultural land which gave a slight deposit of iron oxide when it contained diatoms and a few iron organisms. A well near Wigan and water from Garstang in 1894 contained iron organisms, though they did not develop to any extent. The only sample of water containing bicarbonate of lime which he had met with, having any iron organisms in it, was one in 1895, which was from a shallow well with an iron pump; but they did not develop. Two instances occurred in 1896 in the case of water from wells after the water had been conveyed in iron pipes. These organisms undoubtedly lived on carbonaceous matter dissolved in the water.

### The Value of Geology.

In the course of the address of Professor W. W. Watts, M.A., in the Geological Section, he made the following remarks as to the functions of geology in education and in practical life: "While geology has been of direct scientific utility in topography and geography, there is another domain—that of economic geology—which is entirely its own. The application of geology extends to every industry and occupation which has to do with our connection with the earth on which we live. Agriculture, engineering, the obtaining of the useful and precious metals, chemical substances, building materials, and road metals, sanitary science, the winning and working of coal, iron, oil, gas, and water—all these, and many more, pursuits are carried on the better if founded on a knowledge of the structure of the earth's crust. . . The coal miner will require especially a full knowledge of the coal-bearing systems, not in our own islands merely, but all over the world; a special acquaintance with the effects of folds and faults, and an advanced training in the maps and sections of coal-bearing areas. The vein miner should be well up in faulting and all the geometrical problems associated with it, and he should have an exhaustive acquaintance with the vein and metalliferous minerals. The water engineer needs to know especially well the porous and impervious rock types, the texture and composition of these rocks, the nature of their cements and joints, and the distribution of water levels in them. Further, he must know what there is to be known on the problems of permeability and absorption, the relation of rain to supply, the changes undergone by water and the paths taken by it on its route underground, and the varying nature of rocks in depth. He must also realize the effects of folds and faults on drainage areas and on underground water-courses, the special qualities of water-yielding rocks, of those forming the foundation of reservoir sites, and those suitable for the construction of dams. The sanitary engineer will need to be acquainted with the same range of special knowledge as the water engineer, but will naturally be more interested in getting rid of surface water without contaminating it more than he can help than in obtaining it. He will also need a more detailed acquaintance with superficial deposits than any other class of professional men. . . . The road engineer and surveyor, now that it has been discovered that it is cheaper and better to use the best and most lasting road metal instead of any that happens to be at hand, requires to have an extensive acquaintance with our igneous and other durable rocks. He needs, however, not only petrographic and chemical knowledge, but also a type of information not at present accessible in England—the relative value of these rocks in resisting the wear and tear of traffic, the cementing power of the worn material, and the surface characters of roads made from them—in order that he may in each case select the stone which in his particular circumstances gives the best value for money. It would surely pay county councils to follow, with modifications, the example of the French and Americans, and carry out a deliberate and well-planned series of experiments on all the material accessible to them in their respective districts."

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**Inclined Retorts at New Bedford (Mass.).**—In the "Journal" for the 18th ult. (p. 433), reference was made to a statement by Mr. George G. Ramsdell as to the excellent results obtained during the first 27 consecutive days' working of some inclined retorts recently put in operation at the New Bedford (Mass.) Gas-Works. It may be mentioned that this installation was erected by Drakes, Limited, of Halifax, who are to be congratulated upon the success which has thus attended their work on the other side.

**The Exportation of Monazite Sand.**—According to a statement in the Berlin "Tageblatt," the American concessionaire who has controlled the exportation of monazite sand from Brazil has been granted permission by the Central Government to increase by 1600 tons the quantity sent away. Pending the result of legal proceedings between the individual States and the Government as to the ownership of the sand, the amount was restricted to 250 tons, or equal to about 25 tons of thorium. The increase now permitted will, it is assumed, meet mantle makers' requirements in the immediate future. It appears that the attempts which have been made for some time past to constitute a monopoly of the sand have been quite abandoned, as it is recognized that the existing political conditions in Brazil would not afford any security for such a monopoly.

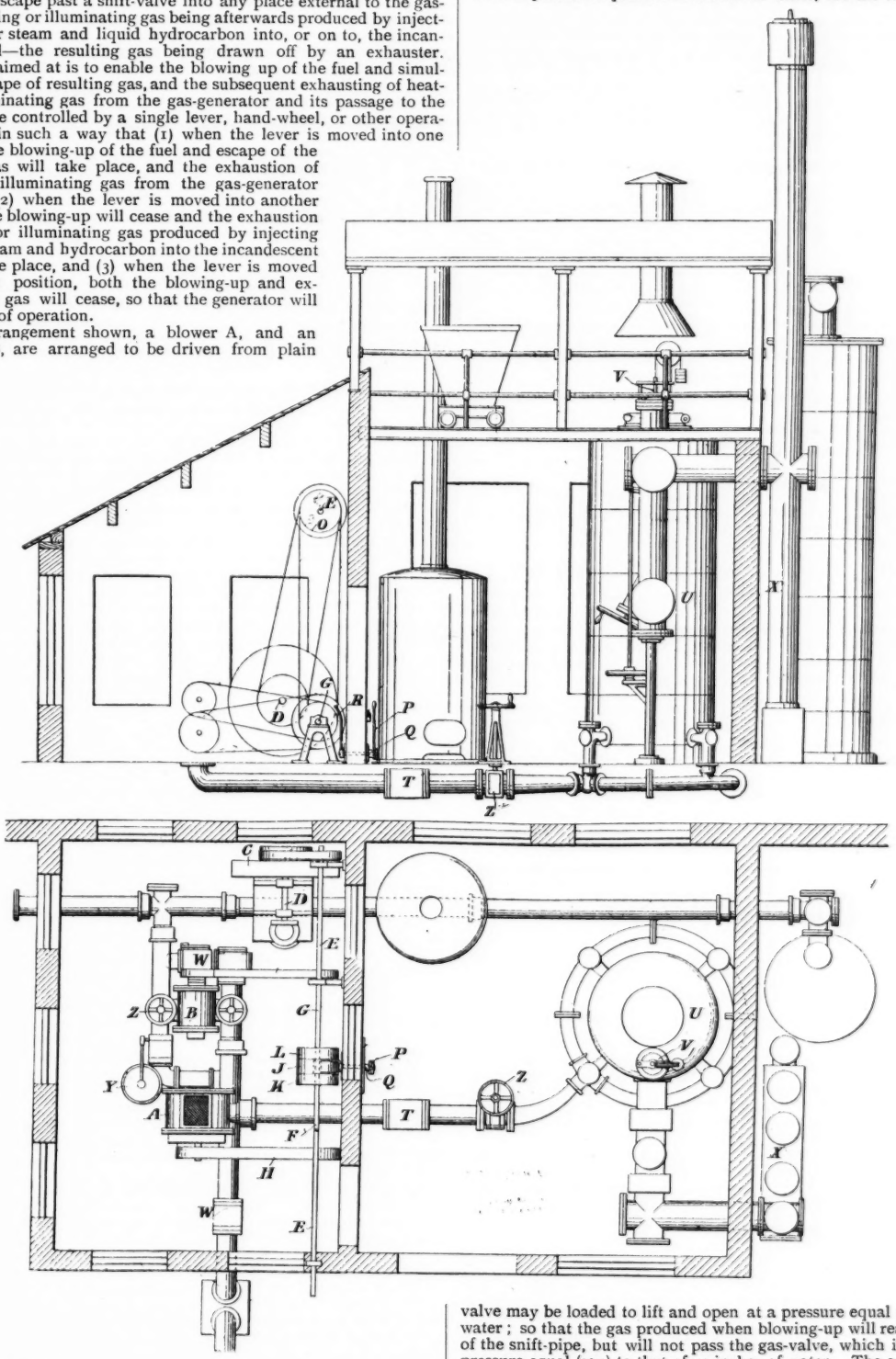
**Incandescent Gas for Railway Carriage Lighting.**—As the result of some trials of the incandescent gas system for lighting the carriages on the Eastern of France Railway, it was found that the mantles lasted from 49 to 51 days, and for distances varying from 25,068 to 31,974 kilometres, or about 16,000 to 20,000 miles, corresponding to 400 and 475 lighting hours. Some lasted for runs of 49,309 kilometres, or 30,700 miles, without breaking; but they had to be removed owing to a falling-off in their light-giving capacity. A number of mantles tested to their utmost limit broke after a total distance of 63,294 kilometres, or 39,500 miles; while one, after 65,636 kilometres, or 40,700 miles, was worn to such an extent that it had to be replaced. Of the entire number of mantles used, 45 per cent. were removed intact, so far as their tissue was concerned, and only had to be replaced on account of their diminished illuminating power.

# REGISTER OF PATENTS.

**Production of Gas Suitable for Heating and Illuminating Purposes.**—Tully, C. B., of Earlsfield, S.W. No. 22,092; Oct. 10, 1902.

According to this invention, a gas generator or cupola is charged with fuel raised to incandescence by an air-blast, and the resulting gas allowed to escape past a snift-valve into any place external to the gas-main; heating or illuminating gas being afterwards produced by injecting steam or steam and liquid hydrocarbon into, or on to, the incandescent fuel—the resulting gas being drawn off by an exhauster. The object aimed at is to enable the blowing up of the fuel and simultaneous escape of resulting gas, and the subsequent exhausting of heating or illuminating gas from the gas-generator and its passage to the holder, to be controlled by a single lever, hand-wheel, or other operating device in such a way that (1) when the lever is moved into one position, the blowing-up of the fuel and escape of the resulting gas will take place, and the exhaustion of heating or illuminating gas from the gas-generator will cease, (2) when the lever is moved into another position, the blowing-up will cease and the exhaustion of heating or illuminating gas produced by injecting steam or steam and hydrocarbon into the incandescent fuel will take place, and (3) when the lever is moved into a third position, both the blowing-up and exhaustion of gas will cease, so that the generator will then be out of operation.

In the arrangement shown, a blower A, and an exhauster B, are arranged to be driven from plain




or cone pulleys, fast on separate counter-shafts placed end to end and provided with fast and loose pulleys. The fast pulleys are fixed to the respective shafts, and the loose pulley arranged between the fast pulleys so as to freely rotate around the abutting ends of the two shafts. Around the fast and loose pulleys works a driving-belt, driven from the main shaft D of an engine C, or from a counter-shaft E driven from the engine shaft. Adjacent to the driving-belt, there is a belt-shifter fixed to a rod provided with a hand lever that may be arranged to work over a plate bearing the words "blow," "stop," and "exhaust." The arrangement is such that when the lever is moved into the mid or "stop" position, the driving-belt will run on the loose pulley, and both the blower and exhauster will be out of action; when it is moved into the "blow" position, the driving-belt will be moved on to the fast pulley that drives the blower; and when it is moved into the "exhaust" position, the driving-belt will be moved on to the fast pulley that drives the exhauster. The non-return valves on the blast-main, the snift-pipe, and the gas main, are suitably weighted clack-valves that are normally held closed.

With a pressure in the holder (say) to 3 inches of water, a hydraulic seal equal to about 12 inches of water, and a blower adapted to deliver air at a pressure equal to 20 inches of water, the air-valve and snift-valve may be loaded to lift and open at a pressure equal to 2 inches of water; so that the gas produced when blowing-up will readily pass out of the snift-pipe, but will not pass the gas-valve, which is closed by a pressure equal (say) to that of 12 inches of water. The exhauster may be arranged to work at zero pressure, or with a slight back-pressure, and so as to force the gases drawn from the generator past the gas-valve (a clack-valve or hydraulic seal) and into the gasholder; the air-valve and snift-valve being then closed and held closed by the external pressure upon them.

Between the outlet from the generator and the main leading to the exhauster and holder, purifying apparatus of any suitable kind may be interposed, and a compensating governor arranged in connection with the exhauster and gas-main as usual. The invention may advantageously be used in connection with the apparatus described in patent No. 26,461 of 1901.

For driving the blower and exhauster, separate counter-shafts F and

G are placed end to end; and on the former shaft there is fixed a pulley connected by a belt to a pulley on the blower, while a pulley fixed on the shaft G is connected by a belt to the exhauster. Mounted on the two adjacent ends of the shafts is a loose pulley J; while on them are fixed, close to the pulley J, pulleys K and L respectively. The engine-shaft is connected to the counter-shaft E by a belt; and a belt connects a pulley O on the shaft E with one or other of the pulleys J, K, and L, according as a lever P, whose shaft Q carries a belt-shifter, is in one or other of the three different positions named above. T is a clack-valve on the blast-pipe leading from the blower to the generator U. V is a similar valve on the snift-pipe; and W is a similar valve between the exhauster and the generator U. There is also a hydraulic seal, of the kind already referred to, between the exhauster and the holder (not shown). X is a purifying apparatus between the generator U and the exhauster; Y is a compensating governor in connection with the exhauster and the main; and Z are hand stop-valves on the blast-main and the gas-main.

**Mantles for Incandescent Gas Lighting.**—Worsnop, C. H., of Halifax.—No. 21,861; Oct. 8, 1902.

The inventor's object is to improve the colour of light given by incandescent mantles, and impart to them greater strength and durability. Whereas, he remarks, the usual way to make mantles is to prepare a solution of soluble salts of thorium and cerium in the proportion of ½ to 2 parts cerium with 100 parts thorium—⅔ part of the cerium solution is found to give the most brilliant light—and to pass through the solution a cotton fabric, afterwards burning the fabric off, his object is to do away with the vivid brilliancy given by the blue or green cast in the light of mantles in general use by using the following mixture, which is said to give a "very bright yellow light, which approaches the quality of daylight as nearly as any artificial gas-light yet in use."

| | |
|---|---|
| Soluble salts of thorium . . . . . | 100·00 parts. |
| ,, ,, ,, cerium . . . . . | 2·75 ,, |
| ,, ,, ,, strontium . . . . . | 1·25 ,, |
| Silica or zirconia . . . . . | 1 co ,, |
| | 105·00 parts. |

An ordinary mantle is soaked in the solution, passed through rollers to dry, then burnt off in the usual manner, and stiffened with any suitable substance in the customary way. After this, it is ready for use.

**Preventing Shock to Incandescent Mantles and Maintaining them in a True Position.**—Eaves, T., of Bolton. No. 2647; Feb. 4, 1903.

The inventor proposes to support the burner, mantle, and mantle-carrying rod by means of dished plates between which is located a spiral spring disposed below the burner. The spiral spring is secured in position on the bottom dished plate by a socket prepared to receive the end of the wire forming the spiral spring.

**Gas Cooking-Stoves.**—Price, H. A., and Turner, F. W., of Camberwell Road, S.E. No. 16,429; July 25, 1903.

This invention relates to an automatic catch to be fixed to the outside of the oven, and operated upon by the handle of the cock fixed in the gas-supply pipe to the oven in such a manner that, should the cock be turned on at any time, either by accident or otherwise, the latch is raised and the oven door opened, and when shut again, the catch goes back to its original position—being hung on a centre.

# CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

## The Fiscal Question.

SIR,—Referring to Mr. Hunt's letter in the last number of the "JOURNAL," I should be glad if that gentleman or anyone else can show the advantage of having the bread taken out of our mouths, as I have just experienced in two cases. I find two large companies laying some thousands of tons of gas and water pipes, imported from the Continent. This means that about 5 per cent goes into the pocket of some agent, who, I trust, is not an Englishman; and this country loses the other 95 per cent. value of material, labour, and profit.

Even the gas manager is affected by the unfair competition of Free Trade. He cannot expect his salary increased unless his company are progressing; and some of the managers in Wales and other places could speak of the stagnant condition of their companies owing to declining trade.

*Sept.* 17, 1903. TRAVELLER.

SIR,—With respect to one of your recent arguments on the fiscal question, based on the assumption that the coal-tax is paid by the foreigner, it might be as well for your readers to know that a clause is now being accepted by Durham coalowners in their contracts to the effect "that if the Government should by any means raise the tax, the coalowners should pay whatever extra tax might be levied at the time of shipment; while in the event of a reduction of the tax, the Germans should also have the benefit of it." The quotation is from the "Newcastle Daily Chronicle." There is only one meaning to this—namely, the coalowners pay the duty.

*Redheugh, Sept.* 17, 1903. T. HARDIE.

## Gasholders in the Recent Storm.

SIR,—Having received several inquiries as to the stability of the spiral-guided, columnless gasholder recently erected for this Company by Messrs. R & J. Dempster, I am pleased to state that the gasholder having on Friday, the 11th inst., been subjected to a very severe trial, in a most violent gale of wind and under unfavourable conditions, the result was perfectly satisfactory.

The steel tank containing the gasholder is 104 ft. 6 in. in diameter, and stands entirely above the surface of the ground. At the time of the storm, all three lifts of the holder were full; so that the crown was raised upwards of 90 feet above the ground level. Standing upon the balcony plate of the tank, no movement of the gasholder was perceptible; while a column-guided holder, 80 feet in diameter, showed distinct oscillation, and affected the pressure-register to the extent of 3-10ths of an inch. I possess no means of recording the pressure or velocity of the wind; but the sudden gusts were so violent that a large elm tree about 3 feet in diameter, and situated about 150 yards from the gasholder, was broken off above the ground by the force of the wind.

*Romford Gas-Works, Sept.* 19, 1903. W. D. CHILD, Engineer.

# LEGAL INTELLIGENCE.

## BROMPTON COUNTY COURT.—Friday, Sept. 18.

(*Before His Honour Judge* STONOR.)

### A Question as to "Partial Construction."

Application was made to-day by William Porter, a labourer, of 70, Royal Terrace, Kennington Park, S.E., under the Workmen's Compensation Act, for compensation from Messrs. Aiton and Co., Gas and Water Engineers, &c., Willesden Junction, N.W., in respect of personal injuries, sustained while in their employ.

Mr. M'CURDY appeared for the applicant; Mr. CHESTER JONES for the respondents.

Mr. M'CURDY stated that on the 8th of May last his client was assisting in fitting and fixing pipes—mainly water-pipes—at the electrical station of the Fulham Borough Council. Some planks had been laid across a hole in an upper floor, and one of them slipping as Porter caught hold of it for the purpose of lowering himself on to a girder, he fell a distance of about 20 feet. One leg and one wrist were badly injured; and he had been unable to do any work. The respondents contended that the man's work was not employment to which the Act applied; and therefore it was necessary to go somewhat into details. It appeared that in 1898 the Fulham Borough Council erected a portion of the building in question, the height of which was about 50 feet, leaving room for subsequent extension. In 1902, they wished to complete the building, and accepted three tenders, each for a portion of the work. A tender sent in by the respondents was one of those accepted; and it was upon work in connection with this that the applicant was engaged at the time of the accident. He (Counsel) would submit that all three firms of contractors were "undertakers" within the meaning of the Act.

Evidence was given by officials of the Council, bearing out Counsel's statements regarding the description of the building and the nature of the applicant's work. Emphasis was laid upon the point that in the original design of the building in 1898 room was left for the "extension scheme," upon which the applicant was engaged at the time of the accident.

The applicant having given evidence as to the accident,

In cross-examination, he said his work consisted in helping to fix the pipes, some of which were passed through, and cemented to brick walls. The plank that slipped was placed in position by men working for one of the other contractors.

Mr. M'CURDY referred to the case of *Hoddinott v. Newton, Chambers, and Co., Limited*, in connection with which Lord Macnaghten had pointed out that the Workmen's Compensation Act spoke of a building being "constructed," not "erected;" adding that the "construction" might be "partial"—*i.e.*, not concerning the erection of the whole building. In accordance with the case referred to, he submitted that whenever new material, as in the present instance, was put into a building, there was in such work something of the nature of "construction." It did not matter whether such work were done immediately after the main portion of the building had been completed or years afterwards. Counsel went on to quote from the cases of *Mason v. Dean*, the ruling in which was endorsed in the House of Lords, and *Cooper and Keen v. Wright*, in support of his submission that a person who contracted for, and carried out, a portion only of such work as that in question was an "undertaker" within the meaning of the Workmen's Compensation Act.

Mr. CHESTER JONES submitted first that the evidence failed to show that his clients were "constructing" the building at the time of the accident; and, secondly, that it failed to show that there was "scaffolding" being used. The putting of "chattels" into a building was not part of the work of "building." In order to succeed, his friend must prove that respondents, on May 8, were constructing the building.

His HONOUR: It was "additional construction."

Mr. CHESTER JONES: Then I submit it cannot be said that, on the 8th of May, the building was being constructed by means of "scaffolding," simply because these few boards were left for the men to walk over.

His HONOUR: I certainly think it was scaffolding. The boards were for the men to work upon.

*James W. Aplin*, the respondents' foreman on the job, gave evidence regarding the precise nature of the work. He stated that his people did none of the cementing of the pipes into the walls, but simply fixed them in proper position.

His HONOUR: I think this work was part of the construction, and had to do with the purpose for which the building was put up; and I consider that the applicant is entitled to his compensation.

It was explained that the man's wages had been 30s. a week, and the award was accordingly fixed at 15s. a week. Costs were allowed on the "B" scale.

Stay of execution for three weeks was granted.

# MISCELLANEOUS NEWS.

## GLASGOW CORPORATION GAS DEPARTMENT.

**The Late Mr. Foulis—The Contracts for the Supply of Meters—The Charges against the Manager of the Tradeston Works—The Annual Accounts—The Recent Engineership—Differential Prices for Gas.**

At a Meeting of the Town Council of Glasgow last Thursday—Sir JOHN AIRE PRIMROSE, Lord Provost, in the chair—several items of important business connected with the Corporation Gas Department were considered.

### DONATION TO MRS. FOULIS.

The Gas Committee recommended that a grant of £700 be made to the widow of the late Mr. Foulis, as a tangible recognition and appreciation on the part of the Corporation and the Committee of the faithful and valuable services rendered by Mr. Foulis as Chief Engineer and General Manager to the Gas Department during the long period of 34 years.

Mr. R. M. MITCHELL, the Convener, moved approval of the minute. He hoped the Corporation would most cordially approve of this very moderate request, which only amounted to six months' salary. He knew it would be very much appreciated if it were unanimously agreed to. Looking over the 34 years' service of Mr. Foulis—and indeed since his death they had learned even more to appreciate his great services to the Corporation—he thought it was a most moderate sum which they proposed.

Mr. SCOTT GIBSON said he wished fully to recognize the great services which Mr. Foulis rendered to the Corporation; but he was also conversant with the fact that during all the years he was connected with the Corporation, he received a very fair salary for his services. He hoped that some system would be in operation soon whereby there would be some equitable method for disbursing funds of this sort. It was very awkward for some of them to assent to this when the widows of poorer employees were treated with scant courtesy. He had no desire to say one word against the action of the Committee in this instance; but he hoped that a more equitable system of making these grants would be instituted.

The proposal was agreed to unanimously.

### THE CONTRACT FOR THE SUPPLY OF METERS.

Bailie P. G. STEWART called attention to the minutes of the Sub-Committee on Contracts, which recommended acceptance of the offer of Messrs. James Milne and Son, for meters; and to a subsequent minute of the Gas Committee, which recommended "that two-thirds only of the contract for meters be given to Messrs. James Milne and Son, Limited, and that the remaining one-third of the contract be given to Messrs. R. Laidlaw and Son, Limited, provided they agreed to supply the meters subject to the same discounts as those contained in the offer by Messrs. Milne and Son." These minutes, he said, showed that a remarkable change had come over some of the members of the Committee. These firms were in a ring in connection with the gas-meter trade, the agreement in which was that Scotch firms were not to offer meters in England, and the English firms were not to offer meters in Scotland, except at a price very much higher. Consequently, English firms did not get Scotch contracts, and Scotch firms did not get English contracts. Messrs. Laidlaw broke away from this ring, and came under a penalty of £500 for doing so. The Corporation made up their minds that they would give their contract to Messrs. Laidlaw, for the purpose of breaking up the ring. They were successful in doing so; and last year the firm obtained the contract for the whole of the meters. As a matter of fact, Mr. Laidlaw was one of the Trustees of the ring, and consequently could not sign his own execution, and the £500 was never paid. Now they found that Messrs. Milne had also broken away from the ring; and in putting in for the Glasgow contract, Messrs. Milne were the lowest offerers. But the Gas Committee had given one-third of the contract—amounting to some £6000 or £7000—to Messrs. Laidlaw. That simply worked out in this way—that, supposing they had half-a-dozen offers, they did not give the contract, to the lowest firm, but reserved a part of it, and gave it to another, to whom they said that, if they came down to a certain figure, they would get a portion of the work. Had this ever been done before? He said they were treading on dangerous ground. Messrs. Milne were quite able to carry out the whole work; and he would like to ask whether any negotiations had taken place with Messrs. Laidlaw to give them a portion of the contract on condition that they would come down to the terms of Messrs. Milne.

Mr. R. M. MITCHELL said that in July, 1900, Messrs. Laidlaw were instrumental in breaking up the ring of meter manufacturers. In that year, by their action, the Corporation gained 5 per cent. on the cost of meters, as compared with the price at which they got meters before. Messrs. Laidlaw had supplied meters to the Corporation ever since the time when the gas undertaking was taken over by them; and for years before that they supplied meters to the old Gas Companies, with perfect satisfaction. This was the first time that the Contracts Sub-Committee had ever entirely cancelled them as offerers, and declined to give them any orders. In 1900, the Corporation had secured great benefit by their action. He did not know anything about the £500 transaction; but he did know that the reduction of 5 per cent amounted to a very considerable sum. In 1901 and 1902, Messrs. Milne got a third of the contract; and the Metropolitan Meter Company got a small share, because they wanted to test their meters, which they had not had before. Messrs. Laidlaw had two-thirds of the Corporation requirements. It happened that this year Messrs. Milne and Son, who had also for a long time supplied meters to the Corporation, had dissociated themselves from the combination. They only did so because they knew that unless they did they would have no chance of getting any further orders from the Corporation. They simply followed the lead of Messrs. Laidlaw. The difference between the two offerers was 1¾ per cent.; while in 1900, through the action of Messrs. Laidlaw, the Corporation gained a reduction of 5 per cent. over the cost of their whole meters. Now the Gas Committee thought the Contracts Sub-Committee had arrived at a somewhat hasty conclusion, because really they were greatly indebted to Messrs. Laidlaw in getting any reduction at all. He should like to place before the Council the fact that Messrs Laidlaw were large ratepayers in Glasgow—perhaps one of the very largest. It was quite true that their meters were made in Edinburgh; but their other works were in Glasgow, and they paid considerable rates in the city. For many years they had supplied the Corporation, not on account of any preference, but because they had been able, in fair competition, to do their business to the satisfaction of the Corporation. Was it fair that the Council should take away from them this year their share of the contract, simply because of the other firm in Edinburgh—he had nothing to say against them, as their meters, he believed, were as good as any? Was it fair, however, that they should take away their share from large ratepayers in the city, who had been the means of gaining them great advantages? He moved the recommendation of the Committee.

Bailie P. G. STEWART moved that the whole contract be given to Messrs. Milne, who were the lowest offerers. He never heard a speech made in the Council which was such a piece of special pleading. The thing condemned itself. He thought a good enough case had been made out for sending the minute back. Did Messrs. Laidlaw leave the meter ring to suit the Corporation, or to suit themselves? Everybody knew that it was to suit themselves, and that they would enter into the combination again if it suited them. It was clearly their business to keep these two firms from combining and putting their heads together.

Mr. GRAY seconded. The arguments of Bailie Stewart were, he said, unanswerable. There was a question of principle; and when the Convener talked of the action of the other firm, that was no reason which should be adduced there.

Mr. SCOTT GIBSON thought that if Messrs. Laidlaw were courageous enough to break away from a combination, they ought to do what they could to encourage them. He could not understand some labour members. They insisted upon the encouragement of home markets, and, when they got the opportunity, they made strong speeches to the opposite effect. He held that even if there were a slight inequality between offerers, the home firms ought to get the preference. The home ratepayers had the best right to expect the Corporation to find employment for them.

Bailie STEWART wished to assure the Corporation that neither firm made a single meter in Glasgow.

Mr. BATTERSBY thought that the minute and the explanations made by the Convener presented a very curious method of doing the business of a large corporation, and it was not a method which was to be commended, because they, as custodians of the public interest, ought to deal with such matters on an equitable principle. The method that was generally adopted was to take the lowest offer—all other things being equal. He took it that Messrs. Laidlaw went into the ring to serve their own object—they proposed to enrich themselves at the public expense; and he thought it was an obviously plain deduction that they had ceased to be in the ring because it did not pay them. He felt constrained to support the amendment.

Mr. WALLACE thought the opposition were making a mountain out of a molehill. The Corporation were not bound to accept the lowest or any offer. They were assured that year after year there had been considerable difficulty in securing a sufficient number of meters at various seasons; and chiefly in consequence of that he supported the proposal to give one-third of the contract to Messrs. Laidlaw.

Bailie FINLAY held that whoever offered the lowest price should get the contract. It was an absolute farce to send out schedules and estimates, and then break up the contract and give part of it to somebody else whose offer was not the lowest.

Mr. BLAIR did not agree with the explanation of the Convener. He thought the commercial morality of the Corporation should be higher than to make the offer of any firm a lever wherewith to lower the price of another.

Mr. W. MACLAY thought the question a very simple one. It was admitted on all hands that the meters were of equal quality. One of the firms happened to quote less than the other; and he thought that firm were entitled to get the order.

A show of hands was taken, with the result that the amendment of Bailie Stewart was carried by an overwhelming majority.

### THE CHARGES AGAINST THE MANAGER AT TRADESTON.

The Council then took up what was referred to as the Tradeston incident. This consisted of charges brought against Mr. John Wilson, the Manager of the Tradeston works, by Councillor Burgess. The report of a Sub-Committee on the subject has already appeared in the "JOURNAL" (see *ante*, p. 628). Their recommendation was that Mr. Wilson be censured, and a reduction be made in his salary to the extent of £50 a year. Councillor Burgess and Bailie P. G. Stewart, however, dissented from this finding, and placed before the Gas Committee a long narrative of their view of the case, and submitted that "no consideration of leniency ought to induce the Corporation to retain Mr. Wilson in the service. He would, in their opinion, be sufficiently leniently dealt with if the Corporation refrained from prosecuting. The subscribers would not, in the circumstances, press for a prosecution, but they did think, in the interests of the proper discipline of the Tradeston Gas-Works, that Mr. Wilson should be removed from the managership; and they recommended accordingly." When the report came before the Gas Committee on the 9th inst., Mr. Wallace moved the approval of the recommendation of the Sub-Committee; Mr. Blair moved that Mr. Wilson be asked to send in his resignation; and Mr. Murray moved that he be censured. The last motion, on a final vote, was adopted by eight votes to six for the recommendation of the Sub-Committee.

Mr. R. M. MITCHELL, in the Council, moved the approval of the minute of the Committee. In the first place, he should like to say that no one regretted more than he did that such a subject should have had

to come before the Committee at all; and he was all the more sorry for it because it came before them in the absence of their Chief Engineer, Mr. Foulis. He knew that the matter was one of very great sorrow to Mr. Foulis—one which he never anticipated, and one which, to an honourable, straightforward nature like his, caused him the utmost pain and grief. In discussing the finding of the Committee, he would like to accentuate the statement in the report that they all felt that Councillor Burgess deserved the thanks of the Gas Committee for going into the matter so thoroughly. Whatever difference of opinion they might have on the result of the investigations of the Committee, they who took a different view from Mr. Burgess were most willing and most anxious to acknowledge that he was actuated by no different motive from themselves. Their only desire was to do what, in their minds, was justice between Mr. Wilson and the Corporation. They would observe that the findings of the majority of the Committee were very easily understood. He could not, for a moment, defend the Tradeston Manager in any of the things which he himself admitted that he had done. It was no excuse at all, to his mind, to say that the sums involved were very small. It was no excuse to say that irregularities of which he was guilty were perhaps part of a previous system, where he was allowed certain things at first, because he got remuneration in order on his removal from the house at the gas-works, to make him at least as comfortable as he was before. He believed that Mr. Wilson had gradually grown into these things, perhaps without thought on his part. He did not think that he had any desire or intention of being dishonest or unfaithful in the duties which were imposed upon him; and he knew that he enjoyed the greatest confidence of Mr. Foulis, who had often told him that he relied upon Mr. Wilson as one of the most economical managers of the gas-works over which he had control in Glasgow. He was a man who had risen from the ranks, a man who was a successful foreman, and for eleven years was Manager of these works, and, as far as Mr. Foulis knew, was Manager without any blemish or fault, and the result of whose operations would long be felt in the conduct of the gas-works in Glasgow. The Committee, who had come to the conclusion that sufficient punishment for him would be that he should be severely censured, had not done so in a desire to condone any irregularity which might be brought home to him. They found with regard to certain particulars which were brought before them, and with regard to certain admissions which Mr. Wilson himself made, that they could not do less than express their greatest disapprobation of his conduct; but they were not satisfied on the charges of nepotism and victimization alleged against Mr. Wilson. Of course, that was a matter of opinion; but he felt that it was a pity that the matter had come to the front through the dismissal of two men from the works, who had certainly, he must say, done their best in order to make the position of Mr. Wilson as uncomfortable as possible. Both these men were recommended to him by members of the Town Council; and he thought it was just an illustration that all of them should be very careful in inducing a manager of any works to employ any man as a favour. Having said this—and, of course, he was not to be taken as wishing in any way to gloss over Mr. Wilson's deficiencies, or faults, or guilt, in this matter—he could only add that, during his nineteen years' connection with the Gas Department, this was the first time that anything of the kind had ever occurred; and he hoped it would be the last. It was proposed that Mr. Wilson should be asked to send in his resignation. He believed that a w[illegible]kman who was even dismissed would always find employment somewhere or other. But what was to happen to the manager of a gas-works—a man fifty years of age, who had spent thirty years' service there, and who was trusted by their late Engineer? They would see that it was more painful for a man in that position if he went astray. Would the Council dismiss that man? Would they, at his time of life, send him adrift? Would they blot out for ever his chance of getting employment? Would they not rather take a more lenient view—while finding him blameworthy, while censuring him? He believed that censuring him was, perhaps, too small; the other proposal was, he thought, too great. Would the Council not exercise their magnanimity, and give him one more chance? He had had thirty years of service in their works; would they not give him a chance to rehabilitate himself, and try to make himself once more a man—an honoured and respected man in their midst? He left the matter in their hands, and trusted that the Council would deal leniently with Mr. Wilson.

Mr. GUEST seconded. He said that he was not prepared to accept either the recommendation of the Sub-Committee or of the minority, because he felt that if Mr. Wilson had misconducted himself so far as to necessitate their imposing a reprimand and deducting £50 a year from his salary, he should be dismissed from their service. After studying the evidence very carefully, he could not bring himself to think that Mr. Wilson's misconduct was of such a grave character that it deserved so severe a punishment as that.

Mr. BLAIR said it seemed to him inevitable that irregularities should crop up; and in the Corporation service such irregularities had cropped up, and many men had been dismissed for their irregularities. His difficulty was to draw the line between the man who had 30s. a week and the man who had £500 a year. The irregularities the Commissioners put stress upon, he thought, might have been condoned had Mr. Wilson come forward and said he was sorry that the irregularities had occurred, and that he should see that they did not occur again. But the irregularities were only aggravated by Mr. Wilson's subsequent indiscretions—for instance, in the back-dating of his book, and in paying to the Council a sum which, probably, would never have been paid had it not been for the threat of exposure. In this action, he brought in another employee, which was a very unfortunate circumstance indeed. He thought, for the sake of the whole staff, and the encouragement of them to do right, they must, in every way, deal with Mr. Wilson in the same manner as they would deal with any other employee. He did not know that any member of the Council would attempt to justify the actions of Mr. Wilson; and if that were so, there was no other course open to them than to ask him to send in his resignation. He moved to that effect.

Bailie P. G. STEWART said it was not his desire to hound out of office this or any other man. He thought it was right that they should know that while the inquiry was going on, there was the idea that if it had simply been about the re-doing up of Mr. Wilson's house, the censure of Mr. Wilson would probably have been all the extent to which the Committee would be expected to go. But what had happened? When they were obliged to bring these figures before the public, they discovered that Mr. Wilson had been tampering with the witnesses. A great deal had been said about what was to become of Mr. Wilson. What was the treatment these men who came forward got? It was brutal. Did they think it was possible for Mr. Wilson now to manage the works as he had managed them hitherto?

Bailie FINLAY had great sympathy with those gentlemen who had put themselves to extreme trouble, and who had done all in their power to unravel the matter. At the same time, he could not see eye to eye with them. But he knew that, to some extent, they, in the past, were responsible that Mr. Wilson was led into the little things; and he hoped there was some generosity in the hearts of the gentlemen present, and that they would give the man another chance in life. He therefore proposed they should censure him and reduce his salary by £50.

Mr. FORSYTH thought there was only one thing which would satisfy the public, and that was the dismissal of Mr. Wilson.

Mr. BATTERSBY said the irregularities were admitted; the ante-dating of the books was admitted; and yet a gentleman with £550 a year was placed in that position—a gentleman whom they might have expected would have been regular in his work. If Mr. Wilson was not guilty, then the £50 should not come off his salary; if he were to be censured, and they took the £50, then they were actually condoning the offences he had committed. He therefore supported the amendment that they demand his resignation.

Mr. O'HARE was very sorry at one thing which had been said by the mover of the amendment, which was that it was very unfortunate that the thing had come out. He thought it was very fortunate it had come out. It was pleaded that it would be an extreme step to dismiss Mr. Wilson; but many a man had suffered for much more trifling matters, and therefore, in that view, dismissal was justified. The higher the position, and the more responsibility resting on a man, the more necessary it became for him to do right. Was there any single individual in the Corporation who would retain a man in this position, with control of men, and expect that he would be able to discharge his duties, after this? Not a single one of them would retain such a man in his employ. But they saw men of very high character attempting to condone these offences, when it was a matter of the Corporation, and not a matter of friendship.

Mr. SCOTT GIBSON said that to his mind if the offences were so serious as to warrant a fine of £1 a week for life, then it seemed to him that they must take the other extreme, and vote solidly for insisting upon resignation. He was quite confident of this—that if they returned Mr. Wilson to the management of the works, he would have lost all influence.

Mr. MITCHELL was asked if he had anything to say in reply to the discussion, but replied that he had not.

A vote was then taken by calling the roll, when seven voted for the approval of the minute, nine for censure and a deduction of £50 a year from Mr. Wilson's salary, and forty that he be asked to send in his resignation. The demand for resignation thus became the finding of the Council.

### THE ANNUAL ACCOUNTS—THE VACANT ENGINEERSHIP—DIFFERENTIAL PRICES FOR GAS.

Mr. R. M. MITCHELL moved the adoption of the report of the Gas Committee and the accounts of the department for the year. He was very glad to be able to say that the year had been one of great prosperity. Anyone who had looked at the accounts could not fail to see that they had retrieved the debit balance with which they began the year, and that they had arrived at a very satisfactory credit balance at the end. He did not know that there was much requiring to be said about the report. They had the pleasure of being able to propose that the price of gas should be reduced 2d. per 1000 cubic feet as from May 31 last. This was a very small sum, when looked at in this way; but when they knew that it meant £55,000 a year, or thereabouts, the citizens would be delighted to think this amount of money would next year be retained in their pockets. They had every hope that in a few months the Provan Gas-Works would be ready—perhaps by next spring. If Mr. Foulis had survived, they would have been ready, perhaps, a few months sooner. They were quite able to overtake any reasonable demands that might be looked for during the winter; and by the spring of next year he hoped that the whole Council would be invited to see the opening of what, he believed, would be the most complete gas-works in the United Kingdom, or elsewhere. They would observe that they said nothing as to the filling up of the post of Engineer and Manager. He did not think it was right to make any communication at this time; but he believed that they would always find a good man, when the occasion arose. They had been looking into the applications for the post of Gas Engineer; and he thought that probably by another month they would be able to say something on the matter of a satisfactory nature.

Mr. WILLOCK seconded. He said they had not been stinted in the matter of depreciation. Out of the premium account for the conversion of gas annuity stock, they had written off 1½ per cent. to sinking fund, which amounted to £4042. Besides this, they wrote off £19,124 from the same fund, out of the surplus, which he did not think would happen another year, as, under the Act of Parliament, there was a proper sinking fund established for writing down the converted stocks. They had been very much troubled during the year by applications from people who used gas for other purposes quite as much as those who drove engines with it. The man who had a bakery, and who consumed gas during the daytime, the same as the man who used an engine, thought he had quite as good a right to a reduction; and he did not think there was anyone on the Committee who would gainsay this. The matter stood very much in the same relation as it did with regard to electricity. There were certain people who did not come on during the time of heavy load, but who took a large quantity of gas; and it might be worth while to give them gas at a cheaper rate, in order to increase the load during the daytime. The time was not far

distant, he hoped, when the greater number of people would take gas, not only for power, but for other purposes, which would make the city a fresher and more beautiful one. It was quite within the bounds of possibility that manufacturers in Glasgow, by the aid of gas and electricity at cheap rates, would be able to drive motors and do away with the smoke nuisance in the city. The question might arise, Was it right to have a difference of 4d. per 1000 cubic feet between gas used for the different purposes? and he had no hesitation in saying that it was a right and proper basis, so far as the Corporation thought fit, to give electricity for power at 1½d. per unit. The question might arise whether it was profitable, or right, to give the cheaper rate to those using motors, when the cost of production was 2½d. They said it was; and the same might apply in regard to gas—that if the users of gas for power came on during the day, or during the summer, undoubtedly it might be profitable to supply them at a cheaper rate.

Bailie FINLAY moved that they charge a uniform rate of 2s. 1d. for gas. He contended that gas should be supplied to everyone at the same price. If they made a differential rate, they ought to have some reason for it. They were told that the demand for gas for power came on during the day, as it did with electricity. But gas and electricity were not on the same plane. Gas could be made at any time and stored until wanted; but they could not do this with electricity.

Mr. MITCHELL said that in Glasgow they could only store gas for about half-a-day, so that he did not think there was much force in Bailie Finlay's argument.

Mr. MONTGOMERY seconded Bailie Finlay's amendment. He was a member of a Special Committee last year who considered the matter; and, on the strong recommendation of Mr. Finlay, the Committee resolved to give the matter of a lower price for power a trial. He must say, however, that he was quite disappointed with the result. He thought, first, that there would be a great extension of the use of gas, which had not been realized; and, secondly, there had been the discovery of a great many anomalies in the application of the differential rate, because there were large consumers—such as railway companies—who took very much more gas than those who used engines, and who had to pay a high rate.

Bailie HUGH ALEXANDER, who supported the amendment, said he should have liked very much to have known whether it was legal for them, as gas manufacturers, to supply any number of the citizens with gas at a less sum of money than it cost to produce. He did not know what the answer to this would be; but he was prepared to maintain that they supplied 300 million cubic feet last year for power at 4d. per 1000 cubic feet less than they charged for lighting. This enhanced the charge for lighting. They had a clear surplus of £48,000; but if they had sold all their gas at 4d. less per 1000 cubic feet—costing £93,000—the surplus would have become an absolute deficit of £45,000. This proved to him that, on every 1000 cubic feet of gas they sold for power purposes, they lost money; and they had no right to do so. He imagined he could see in the accounts the trail of a strong man who had a strong belief in the potentiality of gas-engines—who believed that, given cheap enough gas, the gas-engine would supersede the steam-engine—but had the Committee any right to subsidize gas-engines? He contended that the proposal was full of anomalies, and was on unsound lines altogether. He believed it was their business to make and sell gas as cheaply as they could, supply it to everybody at the same price, and let them make whatever use they liked of it.

Mr. R. M. MITCHELL asked, in view of the remarks which had been made, that he should be allowed to take back the accounts. He understood that the differential rate agreed upon last year was only for one year. In taking back the accounts, he asked that the step should not be held as derogatory to the Committee.

The Council agreed to the accounts being taken back.

## DOVER GAS COMPANY.

The Half-Yearly Ordinary Meeting of the Dover Gas Company was held on Monday, the 7th inst., under the presidency of the Chairman, Mr. W. MANNERING.

The report of the Directors stated that the result of the working for the half year to June 30 had been satisfactory. The net amount earned was £3796, which permitted of the payment of the statutory dividend (£3207), and left £589 to be added to the amount brought foward. They accordingly recommended a dividend for the half year on the shares and ordinary and consolidated stock at the rate of 7½ per cent. per annum, less income-tax. In April, £5000 of new ordinary stock was offered for sale in London, and was disposed of at prices averaging £141 4s. 5d. per cent. They had also disposed locally of £1867 of new ordinary stock at £150 per cent. The balance due to the bank had been reduced from £29,577 to £17,956; but as the bank desired a still further reduction, the Directors recommended the issue of £7674 of debenture stock.

The CHAIRMAN, in moving the adoption of the report and accounts, said that the receipts for the half year were £23,657, and the expenditure £19,096. As compared with the corresponding period of 1902, the revenue from the sale of gas exhibited a decrease of £216, mainly due to the lower price charged for public lighting, and to a slight falling off (0·37 per cent.) in the consumption. In the first half of 1893, the consumption was 80 million cubic feet; five years later it was 90 million feet; and in the past six months it nearly reached 112 million feet. Residuals realized £161 less; but, on the other hand, meter and stove rentals were £79 more. On the expenditure side, coals cost £560, or 7½d. per ton, less; but the other items of manufacture were altogether £108 more. Distribution charges, too, were £431 more. The total receipts were less by £299, and the expenditure more by £89; making a decreased profit balance of £388. During the half year the sum of £2454 had been spent on capital account; £1928 being the balance due for the new gasholder, and £526 the outlay on new and additional mains and services.

The resolution was carried, the dividend recommended was declared, and the Directors were authorized to raise £7674 of debenture stock.

## OTTOMAN GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held last Tuesday, at the London Offices, No. 9, Queen Street Place, E.C.—Colonel JAMES LE GEYT DANIELL in the chair.

The SECRETARY (Mr. Thomas Guyatt) read the notice convening the meeting; and the report and accounts were taken as read.

The CHAIRMAN said, when last the Directors had the pleasure of meeting the shareholders, they were all agreed—shareholders and Directors alike—that the operations of the Company during the previous half year, and in fact during the whole of the year, had been highly satisfactory, notwithstanding the drawbacks that Turkey and the districts about Smyrna were suffering from in consequence of the failure of the harvest. He thought the shareholders would now agree with him that they had managed to continue to hold their own, and that, in these (what they called) lean months of the year, they had been going on quite as satisfactorily. The accounts showed clearly the position of the business; and therefore he would only go into the details very briefly. Taking the revenue account first, it would be seen that coal had cost £4463, as against £4330 this time last year. In the corresponding half year, there was a deduction allowed for the coal-tax; on this occasion, there was no deduction. Wages, materials, and lamp-lighting were nearly the same; and the salaries and expenses in Smyrna were £112 more. Exchange was about £100 less. Depreciation, renewals, and repairs were £2180, as compared with £2074. The increase was only £100; and, of course, these must always be fluctuating charges in a business like theirs. The charge for the half year under the head of "Imperial Ottoman Government" was £301, as against £158. It would be understood that now they were under the new contract; and instead of paying 5 per cent. on the profits as hitherto, the Company paid 10 per cent.—the change having come into full operation in the past half year. Rent, interest, salaries, and expenses in London amounted to £1038, as against £922. Part of this increase was due to a matter which he mentioned on the last occasion, and which then received the shareholders' approval. The gas-rental amounted to £11,914, as compared with £11,572—showing an increase of £342. Of the total, the public lighting represented £3854, and the private consumers £8060. The latter had been steadily on the increase; but the public lighting had remained practically the same. The residual products had produced rather less—the receipts having been £2522, as against £2597. The profit on fittings, meter-rent, &c., had been £834, as against £745; the rental of meters and fittings being the sources of the addition. The final result was that their operations during the half year gave them a profit-balance of £2712. Regarding the balance-sheet, the item of sundry creditors amounted to £1774, and bills payable to £659; the figures in the corresponding half year being respectively £1343 and £451. Of course, the fluctuation of these figures was unavoidable. The debenture redemption fund of £2000 was explained to the shareholders at the last meeting, although it did not come into the accounts that were before them on that occasion; the transaction which brought it into existence having taken place between the beginning of the year and the date of the accounts. Therefore the item appeared in the accounts now for the first time. The depreciation fund reached £6907, through the annual increment of £1100 and the interest. The item "Imperial Ottoman Government" stood at £1258, as against £610. On the other side of the account, the capital stood at the same figure (£99,197). Sundry debtors amounted to £9504, compared with £8394. Of the former sum, the gas consumers owed £4710, as against £3733. The value of the stocks was £7840, as compared with £7788. The depreciation fund invested stood at £6081. It was represented by Consols, £4700, at cost; and East London Water Company's 3 per cent. debenture stock, £1500. The Directors, he believed, would be investing the difference between the two amounts in the next account. The debenture redemption fund amounted to £2009. It would be some satisfaction to the shareholders to know that the total quantity of gas made was 44,879,000 cubic feet, as against 43,812,000 cubic feet. The quantity of coal carbonized was 4482 tons, as compared with 4151 tons; and the average amount of gas made per ton of coal was 10,010 cubic feet. The net financial result of the half-year's working was—including the £1811 brought forward—a balance of £4524, out of which the Directors proposed the payment of a dividend, on both classes of shares, at the rate of 7 per cent. per annum. He trusted that, by the time they met again, all the troubles in the East would have blown over. He did not know, however, that they would affect the Company's operations to any particular extent. The expenditure that Turkey was in for might be something enormous; but he did not see how it could depreciate the Company's property. He concluded by moving the adoption of the report and accounts.

Mr. H. W. ANDREWS seconded the motion.

Replying to Mr. W. HUGHES, who asked how the debenture redemption fund was invested, the CHAIRMAN explained that they had an opportunity of buying £2000 of debentures; and they therefore did so. The Company now held these debentures, at 5 per cent. interest.

The motion was unanimously adopted.

On the proposition of the CHAIRMAN, seconded by Mr. STRACHAN C. CLARKE, the dividend recommended was declared.

Proposed by the CHAIRMAN, and seconded by Mr. A. M. PADDON, the energetic services of the Secretary, the Engineer and Manager (Mr. John Gandon), and the staff were heartily acknowledged.

Mr. GUYATT having responded on behalf of Mr. Gandon, himself, and the staff,

Mr. A. W. OKE, in moving a vote of thanks to the Chairman and Directors, said it was very satisfactory to find there was an increase in the sale of gas, particularly when it was remembered that they now had to pay a considerably larger sum to the Ottoman Government. The shareholders might therefore rest assured that the increased progress of the Company would more than counterbalance the additional charge in this respect.

Mr. HUGHES seconded the motion; and it was cordially agreed to.

The response by the CHAIRMAN concluded the proceedings.

## PARLIAMENTARY COMMITTEE ON MUNICIPAL TRADING.

### Portions of the Evidence Abstracted.

### Second Day—June 25.

Sir ANDREW NOBLE, Bart., K.C.B., F.R.S.

The first witness to be examined at this sitting was Sir Andrew Noble, Chairman of Sir William Armstrong, Whitworth, and Co., President of the Federated Engineering Employees, and a Director of the Newcastle and Gateshead Water Company, who said he was of opinion that trading or manufacturing by municipalities should be restricted within the smallest possible limits. It would be best if municipalities could be prevented from trading altogether, except in regard to matters such as the disposal of sewage, where there might be serious difficulties in getting private enterprise to undertake to do what was necessary. It was the duty of municipal or local authorities, in the interests of the public, to see that those who carried on undertakings such as the supply of gas, electricity, &c., did their work in an efficient manner; and they could perform this duty much better if they did not carry on the undertakings themselves. He would absolutely debar local authorities from manufacturing or trading in any goods, wares, or merchandise, and thus competing with their own ratepayers. With regard to trades which, from their nature, should be monopolies—such as gas, water, and various enterprises connected with electricity—these were more economically and better carried on by private bodies. In some places municipalities were going into other forms of manufacture—making ice, paving-stones, electrical fittings, &c. He was of opinion generally that where a municipality were engaged in a business like the supply of gas, they opposed electric lighting for fear of their particular industry being ruined; thus municipal trading led to the discouragement of private enterprise.

Asked to give some evidence in support of his contention, witness replied that this country in certain things, which were the subject of what he might call indiscreet legislation, fell behind almost every nation in Europe. Electricity and telephones were examples. Things would have been different if the inventor of telephones had been allowed to work his own idea. Then municipalities very frequently opposed Electric Power Bills; but he was not aware that it had been stated before the previous Committee on Municipal Trading that they did this in consequence of inducements held out by Parliamentary Agents in London. Again, it was quite obvious that the Acts governing the supply of electricity prevented a very great number of people going into the business. The very short limit of time that was given to private enterprise, and the harsh terms of the Act, were greatly against the introduction of electricity; but, of course, the Act had now been altered considerably for the better.

In Newcastle, water, gas, and electricity were, he said, all provided in a satisfactory manner, and at a very cheap rate, by private enterprise. Newcastle was one of the earliest towns to have an electricity supply; and this was no doubt because, the gas being in private hands, the Municipality had no reason to oppose the introduction of a competitor. The tramways had been taken over by the Newcastle Corporation, who had converted them to electric traction; but this had not been done economically. The original estimate for the conversion was about £400,000, while some £800,000 had been expended. It was, however, only fair to say that some of the extra amount was for extensions. He could not say whether the tramways were paying.

Another point dwelt upon by Sir Andrew was that those who paid the greater part of the rates had but little real control of municipal expenditure. His own Company, he said, paid in Newcastle and Manchester no less than £18,000 annually in rates; and they were not represented in any way. This he thought was grossly unfair. He was, of course, a considerable shareholder himself; but he had no vote in regard to this property. The whole of it was, so far as he knew, unrepresented. A very large number of the shareholders were not citizens of Newcastle. He thought it would be fair if joint-stock companies were given a graduated scale of voting, proportionate to the amount at which they were assessed; and also that before a municipality engaged in a costly enterprise, the sense of the ratepayers should be taken. Then again the borrowing powers of municipalities should have a greater fixed relation than at present to their assessable value. When powers were obtained by Provisional Order, it was not necessary to consult the ratepayers at all. It was true that under the Public Health Act the borrowing powers were restricted to two years' assessable value; but this Act was abrogated in most Private Acts. He would like to see a Government audit of all local authorities' accounts—the accounts to be made out in such a form as would enable ratepayers clearly to understand whether proper allowances had been made for depreciation and other charges, how the profits or losses made on trading enterprises had been distributed, and generally setting out everything on commercial lines, with a proper profit and loss account for each department. According to his experience, nothing was more fallacious than figures, unless they were checked by people who understood what charges ought to be made, and could see that all the sums spent were properly placed. If the accounts were made out in this form, it would have a great deterrent effect on municipal trading—at all events, it would allow the ratepayers to see exactly the state of the different trading concerns.

Another thing he objected to was the employees of municipal bodies being allowed to vote at elections. Municipalities as a rule endeavoured to please their constituents; and those who were employed by them brought pressure to bear to have their wages raised, and their hours of labour shortened. He thought that this had some influence on the workmen in other trades. Although joint-stock and other companies had no vote, they generally paid a very considerable proportion of the rates; whereas a certain proportion of the people who elected the municipal councils did not pay rates at all. In Newcastle, he thought the persons who did not actually pay rates would be the majority of those who voted. It was perhaps changes like municipal trading that took away very many of the class of men who fifty years ago formed the principal part of the corporations, but who no longer did so. The

## GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 731.

| Issue. | Share. | When ex-Dividend. | Dividend or Dividend & Bonus. | NAME. | Closing Prices. | Rise or Fall in Wk. | Yield upon Investment. |
|---|---|---|---|---|---|---|---|
| £ | | | p.c. | GAS COMPANIES. | | | £ s. d. |
| 590,000 | 10 | April 17 | 10½ | Alliance & Dublin 10 p.c. | 19—20 | +½ | 5 5 0 |
| 100,000 | 10 | ,, | 7½ | Do. 7 p.c. | 13—14 | .. | 5 7 2 |
| 200,000 | 5 | May 14 | 6½ | Bombay, Ltd. . . . | 5¾—6 | .. | 5 8 4 |
| 140,000 | 5 | ,, | 6½ | Do. New, £4 paid | 4—4½ | .. | 5 15 7 |
| 380,000 | Stk. | Aug. 13 | 12 | Brentford Consolidated | 235—240 | .. | 5 0 0 |
| 300,000 | ,, | ,, | 9 | Do. New . . . | 173—178 | .. | 5 1 1 |
| 50,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. . | 130—135 | .. | 3 14 1 |
| 206,250 | ,, | June 11 | 4 | Do. 4 p.c. Deb. . | 105—110 | .. | 3 12 9 |
| 220,000 | Stk. | Sept. 11 | 10½ | Brighton & Hove Orig. | 207—212* | .. | 5 0 2 |
| 246,320 | ,, | ,, | 7½ | Do. A. Ord. Stk. . | 145—150* | .. | 5 3 4 |
| 460,000 | 20 | Mar. 31 | 10 | British. . . . . | 39½—40½ | .. | 4 18 9 |
| 100,000 | Stk. | Aug. 13 | 6 | Bromley, Ord. 10 p.c. . | 115—120 | .. | 5 0 0 |
| 165,700 | ,, | ,, | 4½ | Do. do. 7 p.c. . | 88—93 | .. | 4 16 9 |
| 500,000 | 10 | May 14 | 7 | Buenos Ayres (New) Ltd. | 10⅝—11½ | .. | 6 4 5 |
| 250,000 | Stk. | June 26 | 4 | Do. 4 p.c. Deb. | 93—95 | .. | 4 4 3 |
| 150,000 | 20 | July 10 | 8½ | Cagliari, Ltd. . . . | 22—24 | .. | 6 17 6 |
| 100,000 | 10 | June 11 | 10 | Cape Town & Dis., Ltd. | 14½—15½ | .. | 6 9 0 |
| 50,000 | 50 | May 2 | 6 | Do. 6 p.c. 1st Mort. | 52—54 | .. | 5 11 1 |
| 1,375,000 | Stk. | Aug. 27 | 5⅝ | Commercial Old Stk. . | 105—108 | .. | 4 16 3 |
| 503,750 | ,, | ,, | 5 | Do. New do. . | 100—103 | .. | 4 17 1 |
| 442,947 | ,, | June 11 | 3 | Do. 4½ p.c. Deb. do. | 87—90 | .. | 3 6 8 |
| 800,000 | Stk. | June 11 | 7 | Continental Union, Ltd. | 120—125 | .. | 5 12 0 |
| 200,000 | ,, | ,, | 7 | Do. 7 p.c. Pref. | 137—142 | .. | 4 18 7 |
| 575,000 | Stk. | Aug. 27 | 5½ | Crystal Palace Ord. 5 p.c. | 112—117 | .. | 4 11 1 |
| 60,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. . | 118—123 | .. | 4 1 4 |
| 112,533 | ,, | July 10 | 5 | Do. 5 p.c. Deb. Stk. | 135—138 | .. | 3 12 6 |
| 486,090 | 10 | July 29 | 10½ | European, Ltd. . . . | 17½—18½ | .. | 5 13 6 |
| 354,060 | 10 | ,, | 10½ | Do. £7 10s. paid | 12½—13½ | .. | 5 16 8 |
| 15,243,200 | Stk. | Aug. 13 | 4⅞ | Gas- 4 p.c. Ord. . . | 85—87 | .. | 5 1 0 |
| 2,600,000 | ,, | ,, | 3½ | light 3½ p.c. max. . | 84—86 | .. | 4 1 5 |
| 3,799,735 | ,, | ,, | 4 | and 4 p.c. Con. Pref. | 103—105 | +1 | 3 16 2 |
| 4,193,975 | ,, | June 11 | 3 | Coke 3 p.c. Con. Deb. | 87—89 | .. | 3 7 5 |
| 258,740 | Stk. | Sept. 11 | 5 | Hastings & St. L. 3½ p.c. | 90—95* | .. | 5 5 3 |
| 70,000 | 10 | June 11 | 8 | Hongkong & China, Ltd. | 15—16 | .. | 5 0 0 |
| 3,800,000 | Stk. | May 14 | 10 | Imperial Continental . | 200—203 | .. | 4 18 6 |
| 473,600 | Stk. | Aug. 13 | 3½ | Do. 3½ p.c. Deb. Red. | 99—102 | .. | 3 8 7 |
| 165,242 | Stk. | Aug. 27 | 6 | Lea Bridge Ord. 5 p.c. | 113—118 | .. | 5 1 8 |
| 561,000 | Stk. | ,, | 10 | Liverpool United A . | 215—217 | .. | 4 12 2 |
| 718,100 | ,, | ,, | 7 | Do. do. B . | 162½—4½ | .. | 4 5 1 |
| 306,083 | ,, | June 26 | 4 | Do. do. Deb. Stk. | 110—112 | .. | 3 11 5 |
| 75,000 | 5 | June 11 | 5 | Malta & Medn., Ltd. . | 4½—4⅝ | .. | 5 5 3 |
| 560,000 | 100 | April 1 | 5 | Met. of 5 p.c. Deb. | 103—107 | .. | 4 13 6 |
| 250,000 | 100 | ,, | 4½ | Melbourne 4½ p.c. Deb. | 102—104 | .. | 4 6 7 |
| 541,920 | 20 | June 11 | 3½ | Monte Video, Ltd. . . | 9—10 | .. | 7 0 0 |
| 1,515,892 | Stk. | Aug. 13 | 4½ | Newc'tle & G'tesh'd Con. | 103—104 | .. | 4 6 7 |
| 376,855 | Stk. | July 3 | 3½ | Do. 3½ p.c. Deb. | 100—102 | +2 | 3 8 8 |
| 300,000 | Stk. | May 14 | 8 | Oriental, Ltd. . . . | 140—145 | .. | 5 10 4 |
| 600,000 | 5 | Sept. 11 | 7 | Ottoman, Ltd. . . . | 5⅞—6⅛ | .. | 5 7 8 |
| | | | | | * Ex div. | | |

| Issue. | Share. | When ex-Dividend. | Dividend or Dividend & Bonus. | NAME. | Closing Prices. | Rise or Fall in Wk. | Yield upon Investment. |
|---|---|---|---|---|---|---|---|
| £ | | | p.c. | GAS COMPANIES. | | | £ s. d. |
| 205,005 | Stk. | June 26 | 6½ | Ply'mth & St'house 5 p.c | 123—128 | .. | 4 15 8 |
| 851,070 | 10 | April 30 | 7 | River Plate Ord. . . | 11¼—11⅝ | .. | 5 19 2 |
| 300,000 | Stk. | June 26 | 4 | Do. 4 p.c. Deb.. | 94—96 | .. | 4 3 4 |
| 250,000 | 10 | April 17 | 8 | San Paulo, Ltd.. . . | 11½—12½ | .. | 6 8 0 |
| 135,000 | Stk. | Sept. 11 | 10 | Sheffield A . . . . | 234—237* | .. | 4 4 5 |
| 209,984 | ,, | ,, | 10 | Do. B . . . . | 232—235* | .. | 4 5 1 |
| 523,498 | ,, | ,, | 10 | Do. C . . . . | 232—235* | .. | 4 5 1 |
| 103,235 | Stk. | Mar. 31 | 5 | Shrewsbury Ord. 5 p.c. | 111—114 | .. | 4 7 9 |
| 6,150,000 | Stk. | Aug. 13 | 5½ | South Met., 4 p.c. Ord. | 119—121 | .. | 4 9 4 |
| 1,780,000 | ,, | July 10 | 3 | Do. 3 p.c. Deb. . . | 87—89 | .. | 3 7 5 |
| 380,940 | Stk. | May 14 | 5 | Southampton Ord. . . | 105—110 | .. | 4 10 11 |
| 87,950 | ,, | July 10 | 4 | Do. 4 p.c. Deb. | 102—105 | .. | 3 16 2 |
| 120,000 | Stk. | Aug. 27 | 6 | Tottenham and Edmonton A. 5 p.c. B. 3½ p.c. | 115—120 / 95—100 | .. | 5 0 0 / 4 10 0 |
| 313,020 | ,, | ,, | 4½ | | | | |
| 182,380 | 10 | June 11 | 8 | Tuscan, Ltd. . . . . | 8—9 | .. | 8 17 0 |
| 149,900 | 10 | July 1 | 5 | Do. 5 p.c. Deb. Red. | 98—100 | .. | 5 0 0 |
| 737,142 | Stk. | Aug. 13 | 5 | West Ham, 5 p.c. Ord. | 93—98 | .. | 5 2 10 |
| | | | | WATER COMPANIES. | | | |
| 780,776 | Stk. | June 26 | 11½ | Chelsea, Ord. . . . | 305—315 | .. | 3 13 0 |
| 150,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. . | 147—150 | .. | 3 6 8 |
| 160,000 | ,, | ,, | 4½ | Do. 4½ p.c. Pref. '75 | 135—138 | .. | 3 5 3 |
| 175,785 | ,, | Mar. 31 | 4½ | Do. 4½ p.c. Deb. . | 137—142 | .. | 3 3 5 |
| 1,720,560 | Stk. | Mar. 31 | 8 | East London, Ord.. . | 205—215 | .. | 3 14 5 |
| 654,740 | ,, | June 11 | 4½ | Do. 4½ p.c. Deb. . | 138—143 | .. | 3 2 11 |
| 1,282,943 | ,, | ,, | 3 | Do. 3 p.c. Deb. . | 92—95 | .. | 3 3 2 |
| 700,000 | 50 | June 11 | 10 | Grand Junction 10 p.c. max.. / 4 p.c. Deb.. | 122—127 / 123—128 | .. | 3 18 9 / 3 2 6 |
| 310,000 | Stk. | Mar. 31 | 4 | | | | |
| 708,000 | Stk. | Aug. 13 | 10½ | Kent . . . . . | 275—285 | .. | 3 13 8 |
| 160,000 | ,, | ,, | 7 | Do. New, 7 p.c. max.. | 190—200 | .. | 3 10 0 |
| 1,043,800 | 100 | June 26 | 11 | Lambeth, 10 p.c. max.. | 292—297 | .. | 3 14 0 |
| 406,200 | 100 | ,, | 8½ | Do. 7½ p.c. max.. | 210—220 | .. | 3 17 3 |
| 350,000 | Stk. | Mar. 31 | 4 | Do. 4 p.c. Deb.. | 122—127 | .. | 3 3 0 |
| 500,000 | 100 | Aug. 13 | 12⅝ | New River, New Shares | 385—395 | .. | 3 16 0 |
| 1,000,000 | Stk. | July 29 | 4 | Do. 4 p.c. Deb.. | 121—124 | .. | 3 4 6 |
| 902,300 | Stk. | June 11 | 7½ | South-wark and Vauxhall Ord. . . . 7½ p.c. max. 5 p.c. Pref. . 4 p.c. A Deb. | 225—235 / 210—220 / 145—150 / 122—127 | .. | 3 3 10 / 3 8 2 / 3 6 8 / 3 3 0 |
| 126,500 | 100 | ,, | 7½ | | | | |
| 489,200 | Stk. | ,, | 5 | | | | |
| 1,019,585 | ,, | Mar. 31 | 4 | | | | |
| 1,155,066 | Stk. | June 11 | 10 | West Middlesex. . . . | 270—275 | −3 | 3 13 9 |
| 200,000 | ,, | ,, | 4½ | Do. 4½ p.c. Deb. . | 136—141 | .. | 3 3 10 |
| 200,000 | ,, | Sept. 11 | 3 | Do. 3 p.c. Deb. . | 92—95* | .. | 3 3 2 |
| | | | | | * Ex div. | | |

corporations now, with few exceptions, consisted of people who bore a very small share of the municipal burdens; and he believed this had made a difference. In all these concerns the interests of the ratepayers (those who actually supplied the money) should be considered. His experience was that a man was very much more careful about expenditure if he had to pay in the event of the enterprise being a failure. If a man was spending other people's money, it did not matter to him so much. In reply to the following question from Lord Zouche: "Would you say that a certain proportion of the electors, rightly or wrongly, would be interested in having the rates raised?" witness said: "I cannot say what proportion, but undoubtedly a certain proportion would be."

Mr. Fenwick said he understood Sir Andrew's opinion to be that municipal trading should be limited within the narrowest possible compass; and he asked him to state what he thought these limits should be. Witness answered that anything that could be done equally well by private traders should be left to them—in the first place because people who were in a private trade would not undertake it unless they knew something about it. When a corporation consisted principally of a number of small shopkeepers, it was not possible, except in rare instances, that they could understand the new businesses which they undertook to manage; and, having little interest against expenditure, or rather possibly an interest in expenditure, they would not be careful of the money of the ratepayers. He did not believe it was possible for any corporation to trade as efficiently as could be done by private enterprise. Then there was another point—namely, that it was not to the interest of the country that private enterprise should be extinguished. If they took most of the great advances that had been made in manufactures, it would be found that this had been done, not by public bodies, but by private individuals. Mr. Fenwick said he quite accepted witness's statement that he did not believe it could be done; but he asked whether, assuming it could be proved that the community could trade on more efficient and economical lines than a private individual, he would say that a case had been established for municipal trading. "No," replied Sir Andrew, "I should not; but for this reason only—that it is not for the interests of the country that private enterprise should be crushed." Mr. Fenwick: "Surely the collective weal, and not that of the private individual, is the consideration we ought to have before us?" Witness: "But I myself believe the advances made by private individuals greatly advance also the public weal." Mr. Fenwick: "Do you admit that the object we ought to keep steadily before us is that of the public welfare, rather than that of the private individual?" Witness: "I am remembering that point, and that dictates my answer. I need only refer to George Stephenson and James Watt. Nobody will dispute the advantages to the country which their inventions brought about.

Sir James Woodhouse said he was anxious to discover with what part of municipal trading witness was dissatisfied. Was he dissatisfied, for instance, that town councils should own water-works, and supply water. Witness said he disapproved of that, and so he did of gas. He thought advantage had not accrued to the community from corporations owning water-works, because, as he had said before, he did not believe they could do it economically. They had not the necessary knowledge for the purpose. He was satisfied with the Newcastle water supply; it was economically managed by a Company, and at the same time paid a dividend. The electricity supply was in the hands of two Companies, who carried on the business very well indeed. He thought the charges were satisfactory to the inhabitants. He had not compared them with those at other places where the supply was undertaken by corporations; but the rate given to the North-Eastern Railway Company was the lowest he had ever heard of. The power was supplied to them on a sliding-scale, under which the highest rate payable was ¾d. per unit. The average rate paid by consumers for lighting purposes was about 3d. per unit; whereas in London he believed it was 5d. or 6d. Then as regarded gas, this was supplied by a Company in Newcastle at somewhere about 1s. 10d. to 2s. per 1000 cubic feet. In the matter of tramways, he was sure private enterprise could have done quite as well as the Glasgow Corporation had. His contention was that this was a business that as a general rule should be left to private enterprise; and he believed that if it had been done by a company under the supervision of the Glasgow Corporation, it would have been done quite as cheaply. It was impossible to express any opinion upon the question of profits without seeing properly audited accounts; but even assuming a large profit had been made (which he could not, from his own knowledge, say was a fact), he did not agree that it was to the advantage of the community that this profit should go into the pockets of the ratepayers rather than into those of shareholders, not one of whom might live in Glasgow. He did not wish to reflect in any way upon the Glasgow Corporation; but he had no means of satisfying himself that there had been a proper allowance for depreciation, and that all the charges applicable to the tramway system had been properly allocated. Therefore, he could not say whether the low fares charged, and so forth, were really the result of the expenditure of capital. In some cases, he had seen balance-sheets where a considerable profit was shown, where he himself would have shown a loss instead of a profit. He disapproved entirely of the policy and practice of Parliament in entrusting these powers to municipalities. It was quite true that, under the Borough Funds Act, 1872, it was necessary to call a public meeting before any Bill could be promoted in Parliament by a local authority, and that any single ratepayer had the right to demand a poll; but he contended that municipalities should not be allowed to risk the money of the ratepayers upon any undertaking liable to supersession by more efficient or less costly methods. The opposition offered by local authorities possessing electric light works to the Electric Power Bills of recent years, and the way in which gas-owning municipalities were opposing the North-Western Electricity and Power Gas Bill, afforded further evidence in support of this argument. If municipal trading was carried to an extreme, as there was now a tendency to carry it, it would kill private enterprise altogether. The duty of maintaining the public health was very properly cast upon

THE

PLAISSETTY MANTLE.

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local authorities; and it was certainly desirable that they should have power over water companies. This was the case at Newcastle, where the Corporation would soon put pressure on the Water Company if they failed to do what the city required. They would probably pull the Water Company up rather faster than they would pull themselves up if they had the supply in their own hands. So long as a company could supply a corporation with what water they wanted, he did not see that anything more was needed.

Mr. E. Orford Smith, City Clerk of Birmingham.

Mr. E. O. Smith, the City Clerk of Birmingham, who gave evidence at great length before the Committee that sat in 1900, said he wished now to deal merely with the question of audit, in answer to Sir Samuel Provis. He handed in a copy of the Birmingham Blue-Book (which was noticed in the "Journal" for June 9, p. 641), to show what was being done there. As indicating what difficulty there would be in a Government auditor mastering all the facts at Birmingham, he mentioned that when he went to the city he found that the local law of Birmingham was contained in thirty Acts of Parliament and nine hundred sections. He was constantly brought in communication with gentlemen who gave gratuitous services to corporations—who gave up not only their time, but in many cases a great deal of money—and he was perfectly certain that there would be a considerable amount of irritation among them at being subjected to surcharges. Some of the corporations were very old, and many of them had large estates which they had been in the habit of managing with some freedom; and if the citizens were satisfied, he did not think they ought to have to go cap in hand even to a Government Department for certain expenditure which they considered necessary. Whatever was the result of the inquiry, he did hope the Committee would save the great corporations from the Government auditor. He preferred the views of Mr. Albert Gray (*ante*, p. 694) with regard to the appointment of an auditor. He did not think the present system was a good one, as it was out of date; but it would not be improved by changing to a Government audit, which would be resented by the corporations of England. His suggestion was that either a chartered or an incorporated accountant of position should be appointed by the corporation and approved by the Local Government Board. This would take away every reasonable cause of complaint. They kept their accounts in their own way in Birmingham; and he did not at all like the suggestion that there should be a kind of uniform system. The accounts should, however, be absolutely complete; and publicity should be given on every point. Copies of the Birmingham Blue-Book were handed to ratepayers who applied for them. The last accounts, for the year to March 31, were finished and sent to the Council on May 30—two months afterwards. A Government audit would take as many years.

Turning to the gas supply, witness said this had been in the hands of the Birmingham Corporation since 1875. The actual net profit realized by them did not go in reduction of the price of gas; but the charge had been materially reduced since the Corporation took over the concern. The ultimate profits arising from the works were by Act of Parliament devoted to the improvement rate—that was, a rate which in Birmingham stood in place of the general district rate under the Public Health Act. It was for the general improvement of the borough; and the reason why Parliament so directed was that they were supplying with gas not only the city, but a large number of local authorities outside. They ran all the risk of finding the money, and of the gas-works being superseded, and so on; and therefore they were permitted, after allowing for certain statutory provisions, to make a reasonable profit for the benefit of the city, which had taken the responsibility upon itself. The price of gas was the same inside and outside the borough. This, of course, was not always the case; but when comparisons were made, there were many things to be taken into consideration. For instance, he noticed that Mr. Arthur Chamberlain had been comparing Manchester with Birmingham in this respect (*see* "Journal" for June 30, p. 942); but he forgot that Manchester had a preferential rate outside. He would not be in favour of supplying gas at cost price, because there was a certain risk with the gas-works, as was the case with everything that was capable of being superseded.

In answer to Mr. Powell-Williams, witness said he adhered to the statement he had made, when writing to the Prime Minister last year, that the duties of municipalities were being constantly enlarged and increased, and they found it very difficult in Birmingham to get men of high position to serve upon the Council. He was still of the opinion he then expressed—"that nothing would be more likely to add to the reluctance of such men to take part in municipal work than feeling that they were liable to incur pursonal pecuniary liability in the ordinary discharge of their laborious duties.

Mr. Arthur Kay, J.P., of Glasgow.

The next witness—Mr. Arthur Kay, a Justice of the Peace for the City of Glasgow—said he was there to represent the Glasgow Ratepayers' Federation. Broadly speaking, he was an opponent of municipal trading; and his object in attending the Committee was to give information as to the financial methods of the city and its enterprises. In Glasgow they had a peculiar way of managing their loans. They had at various periods issued large loans, for which by Act of Parliament they were to provide a sinking fund; but by a subsequent Act the Treasurer was given the management of these funds, and instead of buying up his own stock or Government stocks, he used the money in fresh municipal enterprises. So that, when the loans fell due, the Corporation would have to issue fresh ones, because there would be no liquid capital to pay them off. The finance of the city was consolidated in 1883 by an Act known as the Glasgow Loans Act, which was in the nature of a "pool." Prior to the existence of this Act, each undertaking was under its own Commissioners, and working pretty much upon its own risk. By the Loans Act, however, all the undertakings were brought by a guarantee clause upon the rates, except the tramways and one or two trifling things. The Loans Act was supposed to be advantageous, inasmuch as it would unify the loans; but he did not

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think that anybody saw to what extent it was going to play into the hands of municipal trading later on. It was, in the opinion of a great many of the ratepayers, giving the most sweeping powers to the Corporation, because they held that if the undertakings were on the rates there might come a time when the councillors might not be so reliable as at present—to put it mildly, they might be Socialists; and then there was no knowing what they might do with the rates The Treasurer was a kind of cashier for the various enterprises in Glasgow; he received the sinking fund payments from one department, and lent them if necessary to another. The money was thus always rolling round; they never paid off any debt at all, but simply used the sinking fund to reduce the borrowing. In this way, they found that the money got lent out and sunk in all kinds of adventures—some good, and some doubtful. This system differed vitally from that of the English municipalities. At the present moment, the surplus of assets over liabilities in Glasgow was £3,766,000. In 1891, the surplus was £1,134,000. This was an increase in the communal capital of the city of £2,632,000 in eleven years. During the same period the population had increased 16 per cent., the valuation 45 per cent., the rates 112 per cent., and the debt 119 per cent. These figures, he thought, showed that the increase of debt was altogether out of proportion to the increase of population and valuation. There were two methods of municipal finance. One was to penalize this generation in order to present the next with large free assets; and the other to finance a corporation in the same way as a nation—namely, paying its way and keeping a moderate margin for safety. All this rolling up of capital in Glasgow was a distinct grievance to the present ratepayers, because it came out of revenue. But he was glad in one way, though sorry in another, to say that all their undertakings—particularly the gas, water, and tramways—were kept quite up to date. The amounts written off for depreciation were ample, almost extravagantly ample. With regard to auditors, the cardinal principle he laid down was that the auditor should not be appointed by the people whose accounts he was going to audit.

Questioned by Sir George Bartley, witness said his complaint was that the Glasgow Corporation were inclined to launch out into rather too many undertakings—that they had forgotten their administrative duties and gone into trading. The water supply he took no exception to; there was really no trading in that. They simply made an aqueduct, and the water ran downhill into Glasgow; so that there was no chemical process involved at all. When considering the gas, however, one came immediately to the question of municipal trading. The Glasgow gas undertaking was a most prosperous one; and he had no fault whatever to find with it. As to the electric light works, these so far had hardly managed to pay their way. It was very close financing, and he did not think they had been able to write off quite the proper amount of depreciation. The reason the Glasgow Corporation charged outside consumers more for water than those inside the boundary was because it was thought that the people who bore the risk of the undertaking ought to get the benefit of it.

## ELECTRIC LIGHTING NOTES.

**Marylebone's Dilemma.**

Our readers will probably remember the difficulty in which the Borough Council of Marylebone found themselves a short time ago with respect to their intended purchase of the local undertaking of the Metropolitan Electric Supply Company. The contract, which has been signed for some time, involves a sum of upwards of £1,000,000; but, owing to the omission of certain words from the Special Act of Parliament which the Council obtained, the London County Council declined to sanction a loan of this amount. The Company, wishing to close the matter, obtained from Mr. Justice Buckley an order against the Marylebone Council for specific performance during the current year; but, so far, the latter have been unable to comply with it. At the meeting of the Council on Thursday, the Town Clerk (Mr. J. Wilson) stated that efforts had been made to induce the Board of Trade to grant a Licence constituting the Council an electric lighting authority; thus enabling them to complete the purchase. The Board, however, were not prepared to do this, though he did not regard their decision as final. Failing them, recourse would, he said, be had to the Local Government Board.

**Cheltenham's Deficit.**

Cheltenham has had an unfortunate experience in regard to the electric light undertaking, which has been carried on by the Corporation at a loss for the past eight years; and the ratepayers are showing concern at the existing state of things. At the last meeting of the Town Council, the following resolution of the Cheltenham Ratepayers' Association was referred to Committee: "That as the electric lighting of this borough has since its inauguration eight years ago been conducted at an annual loss, the Municipal Council be asked to invite Sir William Preece (who was originally retained by the Council to advise on the institution of the electric lighting of the town by the Municipal Council) to investigate the electric lighting of Cheltenham, and to advise how the undertaking can be made to pay its way and run at a profit. Should Sir William Preece be unable to visit Cheltenham in person, that he be requested to nominate a competent expert to make the inquiry." On the minutes of the Lighting Committee being introduced, Alderman Skillicorne said they had been told that the deficiency last year would be only £900, but it had amounted to £3904. Mr. Lawrence questioned whether the Committee would have spent £147,000 so lightly if the money had been their own, and not that of the public. They had actually lost £17,162 in carrying on the undertaking. This result has been arrived at in spite of the heavy charge to private consumers of 5¾d. per unit.

**A Loss at Llandudno.**

The revenue account of the Llandudno electric lighting undertaking for the year ending March last shows that, after making provision for the repayment of loans and interest, there is a deficiency on

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the year of £368. This, however, has been provided for out of the balance of £427 which stood to the credit of the undertaking at the commencement of the financial year. At the last meeting of the Town Council, Mr. Griffith said the report was a very disappointing one; and he trusted the members would be afforded an opportunity to go fully into the matter. Mr. M'Masters said he had held all along that there had been no profit made on the works. There was a motive behind the allegations so frequently made in the Council that the department was a profitable one. A certain grant was rushed and pushed through on the strength of the alleged successful working of the department, before the figures now before them could be available to the Council. The Committee had really gained their object then by false pretences. Mr. Jones said it was shameful that the majority of the ratepayers, who could not or did not use the electric light, should be called upon to pay to make up a deficit in the working which could be met by raising the price to consumers. Mr. Chantrey remarked that the Committee hoped to be able to wipe off the deficit during the current year. The Chairman (Mr. R. Bellis) pointed out that the ratepayers had not yet been called upon to contribute a single penny towards the deficit; and he thought they would not be asked to do so.

**Gas v. Electricity at the Antipodes.**

We do not know whether or not the citizens of Sydney (N.S.W.) are to be congratulated on the possession of a Town Clerk—Mr. T. H. Nesbitt—who has been imported from the Mother Country; but those of them, at all events, who have supported the Corporation in their decision to introduce electric lighting will have no cause to complain that this official displays any lack of enthusiasm with respect to the new undertaking. Since this gentleman's arrival from England, he has been constantly writing to the papers on the subject of electric lighting, and pouring in figures in regard to its progress as compared with gas. It was not to be supposed, therefore, that the remark made by Mr. Dickinson, the Deputy-Chairman of the Australian Gaslight Company at the last half-yearly meeting, as reported in the "JOURNAL" a fortnight ago, to the effect that the decision come to by the City Council was "very debateable," would be allowed to pass unnoticed. In fact, it drew from him a letter a column in length in the Sydney "Daily Telegraph," in which he cited a mass of statistics obtained from recent returns—a source of information which he prefers to the "garbled and hysterical" statements which he says appear from time to time in these pages. We are not aware that any remarks of ours on the subject in question justify the use of the terms quoted. However, Mr. Nesbitt is quite at liberty to employ them if he thinks they will strengthen his argument. They will certainly not hurt us. The point the Chairman wished to make was that, in view of the fact that in many of the cities and towns in England and upon the Continent electricity is being superseded by the high-pressure system of gas lighting, the wisdom of adopting the former method of illumination for the streets of Sydney was questionable. Mr. Nesbitt has probably not been in the Old Country or in Europe for some time, or he would have less hesitation in accepting Mr. Dickinson's statement. Of course, any evidence in support of it emanating from us would be regarded as "garbled and hysterical;" but as Mr. Nesbitt is evidently a reader of the "JOURNAL," we may refer him to the statistics of public lighting tabulated by Mr. Thomas Canning, of Newport, which appeared last week (p. 668), and leave him to draw his own conclusions therefrom. The main points in his letter were dealt with by Mr. R. J. Lukey, the Company's Secretary; and as the matter is one of purely local interest, they do not call for extended notice here. One fact, however, may be emphasized. The City Council now pay the Company £14,300 per annum for 2900 lamps; while Major Cardew's estimate for the first portion of the installation of the electric light (620 arc lamps) is £150,000. The Company introduced the present system of incandescent gas lighting in 1897 without any cost to the Council; and as they were prepared to bear the initial expense of putting up high-pressure lamps, it seems to us that it would have been better, as Mr. Lukey points out, to give the new system a trial, "before saddling the ratepayers with a burden of a quarter-of-a million capital for a doubtful experiment." The word "doubtful" was evidently not used by Mr. Lukey without justification, for the electric lighting schemes at certain places in the State—Young, Redfern, Newcastle, Penrith, and Lambton, all municipal concerns—have been failures; and we learn that in the case of the two last-named towns aldermen have had to go to gaol on account of the debt. The largest electric lighting scheme is that of Launceston (Tasmania), on which no less than £111,366 has been expended; while the amount received last year for current supplied for lighting, heating, and motive power was only £8108. And yet this scheme is held up to admiration as one that is paying well! With these examples before him, we think Mr. Dickinson was amply justified in speaking of the decision of the Sydney Council in the way he did. However, it is now too late to draw back; and all that can be done is to live in hope that the ratepayers (of whom the Gas Company are among the largest) will not have to bear a heavier burden in consequence.

**High Prices for Gas Shares at Eastbourne.**—Last week two original £10 shares in the Eastbourne Gas Company were sold locally at £34 7s. 6d. each, and 78 "B" £10 shares at an average price of £24 10s. each. The dividends paid on these shares up to June 30 last were at the rate of 14½ and 11½ per cent. respectively; but as the price of gas will be reduced on Jan. 1 by 2d. per 1000 cubic feet, the possibility of an increase in the distribution next year may have contributed to the high figures realized.

**Constant Water Supply in London.**—The whole of the County of London is now receiving a constant supply of water, in accordance with the provisions of the Metropolis Water Act, 1871, with the exception of Sydenham, which is in the area of the Lambeth Company, and small districts supplied by the Kent and New River Companies, all of which are situated above the statutory limits of height to which Companies are required to furnish a constant supply.


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| SALTLEY WORKS, BIRMINGHAM | 2,000,000 | PETERBOROUGH, ONT. | 250,000 | STRETFORD | 500,000 |
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| SALTLEY, BIRMINGHAM (Second Contract) | 2,000,000 | WINNIPEG, MAN. | 500,000 | YORK (Second Contract) | 750,000 |
| WINDSOR ST., BIRMINGHAM (Second Contract) | 2,000,000 | COLCHESTER (Second Contract) | 300,000 | ROCHESTER (Second Contract) | 500,000 |
| HALIFAX | 1,000,000 | YORK | 750,000 | NEWPORT (MON.) | 250,000 |
| TORONTO | 250,000 | ROCHESTER | 500,000 | TOKIO, JAPAN | 1,000,000 |
| OTTAWA | 250,000 | KINGSTON, ONT. | 300,000 | PERNAMBUCO (Brazil) | 125,000 |
| LINDSAY (Remodelled) | 25,000 | CRYSTAL PALACE DISTRICT | 2,000,000 | MALTON | 150,000 |
| MONTREAL | 500,000 | DULUTH, MINN. | 300,000 | DULUTH, MINN. (Second Contract) | 300,000 |
| TORONTO (Second Contract Remodelled) | 2,000,000 | CATERHAM | 150,000 | BROCKVILLE (ONT.) | 250,000 |
| BELLEVILLE | 250,000 | LEICESTER | 2,000,000 | SMETHWICK | 500,000 |
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## CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Sept.* 19.

**Sulphate of Ammonia.**

A fairly active market has again characterized the week, and prices have hardened slightly; being now £12 3s. 9d. f.o.b. Hull, £12 6s. 3d. f.o.b. Liverpool, and £12 7s. 6d. f.o.b. Leith. Colonial orders have been largely responsible for the purchases. The Continent has, however, responded but weakly, though inquiries from that quarter show signs of awakened interest. No doubt the dispute between the Scotch oil-works and the miners has contributed to the firmer tendency of the market. For delivery up to the end of the year, prompt prices are being generally quoted, and in London quotations have been raised to £12 10s. per ton, Beckton terms. For March-September next year, business is also reported at £12 5s. per ton, ordinary terms, f.o.b. shipping port.

**Nitrate of Soda.**

This continues firm at 9s. 10½d. to 10s. 3d. per cwt. for ordinary and refined qualities respectively.

LONDON, *Sept.* 18.

**Tar Products.**

There is rather more business doing, especially in benzol, for which the demand is strong. Ninety per cent. has been sold for early delivery at 9¼d. and 9½d.; and it is reported that in some instances as much as 10d. has been paid for small quantities for early delivery. There is really nothing offering at the moment in England; but in Germany prices do not appear to have responded to the advance here. In 50 90 per cent., business has been done at from 7¼d. to 7½d. for export; but for home consumption buyers offer only 7d. Toluol remains quiet; and prices are purely nominal. The demand for heavy naphtha is still very strong, and prices remain firm, though there is rather more offering than was the case a few weeks ago. Crude carbolic continues very steady at 1s. 6d., and business is still doing at this price up to the end of the year; but consumers decline to pay any advance for forward delivery. Creosote is still in good demand, and consumers in the North have been purchasing more freely. In pitch, the demand for prompt delivery is fairly good; but for next year very low prices are spoken of. Dealers appear to be offering on the Continent for all 1904 at prices very much under those mentioned by makers who have already secured their tar over that period. It is very difficult to fix the actual value, as at the moment consumers appear to have made up their minds to await developments before contracting; the numerous offers from England leading them to believe in lower prices forward.

The average values during the week were: Tar, 24s. to 31s. Pitch, London, 53s. to 53s. 6d.; east coast, 52s. to 52s. 3d.; west coast, 50s. 6d. to 51s. Benzol, 90 per cent., 9¼d. to 9½d.; 50-90 per cent., 7¼d. to 7½d. Toluol, 6½d. Crude naphtha, 3d.; solvent naphtha, 7½d. to 8d.; heavy naphtha, 9d. to 10d. Creosote, London, 1 7/16d. to 1½d.; North, 1¼d. Heavy oils, 2½d. Carbolic acid, 60 per cent., 1s. 6d. Refined naphthalene, £5 to £8 10s.; salts, 23s. 6d. to 26s. Anthracene, "A" quality, 1¾d. to 1 7/8d.; "B" quality, 1d. nominal.

**Sulphate of Ammonia.**

The market closes very firm, and there is a considerable demand for both prompt and forward delivery. The Gaslight and Coke Company ask £12s. 10s., and are reported to have declined £12 8s. 9d; while the South Metropolitan Company quote £12 12s. 6d., and would not at present accept less than this for prompt delivery. In Hull, business has been done at £12 5s. for prompt, and also for September-December shipment. In Leith, there is evidently a pressure for prompt; and prices are very firm. Makers ask £12 7s. 6d.; but business has been done at £12 6s. 3d. for prompt. In Liverpool, there is a fairly good demand, but transactions have been limited.

## NOTES FROM SCOTLAND.

**From Our Own Correspondent.**

*Saturday.*

A task arising out of the doings of the Glasgow Town Council this week falls to me, which is so uncongenial that I have written every other "Note" before taking it up. Truth to tell, it is no unusual task now, for the number of gas managers in Scotland who have been bustled out of office in recent years has made us all familiar with the process of removal from place and power. We are almost getting into the habit of asking ourselves whose turn it is to be next. I am certain that no one who is acquainted with Mr. John Wilson, of the Tradeston Gas-Works, ever imagined that he would stand in the position he does to-day. Regarding what he did, it is a comfort to know that there was nothing vicious in it. It was certainly a mistake; but that is the most that can be made of it. Probably he thought he was conferring a favour upon the men whom he employed in his house; but that is one of the greatest mistakes which a manager can commit, because, if he favours one, there may be ten whom he does not favour, and they at once become his enemies. Even though it was not Mr. Wilson's intention to confer favours, his action was apt to be so interpreted by the workmen, and the effect I have indicated produced. This was most probably the beginning of the business. Years went on, and there was no whisper of discontent until someone went to Mr. Burgess and unbosomed himself. Then, when it was known that Mr. Burgess was willing to hear any fancied grievances, a stream of workpeople with all sorts of stories poured in upon him. But when all that could be was told against Mr. Wilson, it amounted to a mere figment, and would scarcely have hurt a hair of his head, if it had not been for that which the Committee find he did—the paying of money into the petty cash account and antedating the payment. It was this step which undid Mr. Wilson. There is, it may be conceded, a repugnance to being


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brought to book by one's own workmen, and especially if they are backed up by an outside force whose constant aim is to obtain as much power within the works as the manager possesses; and this may have led to Mr. Wilson's avoidance of the policy of frank admission, which would have saved him. It is somewhat difficult to admt that a man upon whom you look down is right, and that you are wrong; and so Mr. Wilson assumed a dignified defiance, but, in the opinion of the Committee, did not act it. With what joy the prosecutors of the charges must have discovered the incident about the refunding of the money. By its aid, they have got Mr. Wilson out of their way. The fact of the success which has attended the movement against Mr. Wilson will have a very great effect among the men in all works. It was a Trade Union movement. Mr. Burgess, who was the prime-mover, and in whose name the charges were brought, was the Secretary in Scotland of the Gas Workers and General Labourers' Union at the time of the strike of gas workers in Glasgow in November, 1899. He took the lion's share of the work in the course of the inquiry; and though in the Town Council on Thursday he was silent, I shall be very much mistaken if it be not pressed upon workmen all over the country that the Union is a necessity of our time, for the preservation of purity in municipal life. It is one of the most unfortunate results of the Tradeston incident, that it will give prestige to the Union; and the leaders of that organization would not be human if they did not take advantage of it. With so many watchful and unsympathetic eyes upon them, managers will require to walk warily, so as not to give offence to their workmen. The great fight of Unionism in modern times has been for recognition. This has been almost universally refused them. In Glasgow, they have forced the Town Council to recognize them in a way which was not anticipated, and with an effect which they themselves possibly never expected. They have succeeded against Mr. Wilson; and therein there is a curious reflection. Mr. Wilson rose from the ranks; he was himself a workman, and became Manager by reason of his natural gifts. He was a successful Manager, ever pleasing the late Mr. Foulis, whom everyone could not. What encouragement is there for another workman to seek advancement, when it is found that the people about him are ready to become his accusers in any trifling matter? Anything heinous, if they had found such against Mr. Wilson, I could have understood them prosecuting; but the gathering of charges upon the principle of rolling the snowball, to press against a former workman, I do not understand. But then I may not be able to grasp the principles which underlie the Unionism of to-day. It seems to be one of their principles that no mercy is to be shown to anyone who does not foster the Union cause. The chief lesson I read into this case is the relentless animosity of the Union. This has been directed into a new channel, and has been successful at the first encounter. Flushed with the success they have had, may we not expect that the move will be tried again?

The Town Council are divided upon the question of differential rates for gas. There are councillors who do not perceive or admit the advantage there would be in supplying cheap gas for power purposes, or rather the disadvantage there would be in allowing manufacturers who require small power to fall into the hands of the electricians. The hands of the Gas Committee are being forced by the Electricity Department, who are giving electricity at a rate said to be below cost price, in order to get a day load. It is a question of retaliation; and whichever way it be decided, when the accounts again come up for consideration the decision will, as the greater question in the political world is certain to do, leave one set of controversialists unconvinced. Unfortunately, figures were not given to the Council in support of the proposal of the Committee to put a lower price upon gas used for power. These may be forthcoming at the next sitting; and it will then be possible to better understand how the proposal will affect the gas consumption.

It is announced that the Edinburgh and Leith Gas Commissioners, at a meeting in Committee on Monday, resolved to reduce the price of gas from 3s. to 2s. 9d. per 1000 cubic feet. This is the lowest price at which gas has ever been sold in the district. When the Commissioners took over the undertakings in 1888, the price was 3s. 6d. Coal went up; and in 1893 the Commissioners, taking fright, raised the price to 4s. 6d. After a year and-a-half at this figure, the charge came down at various times till, in 1896, it reached 3s. For three years and a half it stood at this figure; and then, for three years further, it went up to 3s. 4d. Last year the Commissioners again fixed the rate at 3s. The present reduction thus makes the price 7d. per 1000 cubic feet lower than it was a year ago. This latter is marvellous work. When it is considered that in 1888 the capital of the undertaking was £460,000, and that it is now £1,290,000, in will be seen what an extraordinary advance has been made in the economics of gas manufacture during the short period of fifteen years. There is greater cause for wonder still, when it is recalled that in 1888 the average price of coal was 11s. 9d. per ton, and that last year it was 12s. 9d. For the current year, the price is somewhat less than this. But still it may be taken to be higher than it was in 1888; and the fact remains that, paying more for coal, and with a very much increased charge for capital, gas is considerably lower in price. Management, including the adoption of improved appliances, must account for this striking result.

As intimated in last week's "JOURNAL," Mr. George Keillor, jun., of Peterhead, has been appointed Manager of the Broughty Ferry Gas-Works. Mr. Keillor has been anxious to get away from Peterhead for some years, and has been on the short list of candidates for appointment in several places. He has done excellent, even outstanding work, in Peterhead, where he had a very hard task before him when he took office, seeing that the place had been filled successively by two most excellent Managers. I hope the same good fortune will attend him in Broughty Ferry.

While agreeing that the Town Council of Broughty Ferry have exercised a wise discretion in the matter of filling up the vacant position of Gas Manager, I do not know that the same can be said of another arrangement which they made on the evening they selected Mr. Keillor. They appointed the Burgh Surveyor to check stocks, and generally to advise on all questions of fabric at the gas-works, and granted him an


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increase of £15 a year to his salary in respect of his new duties. It is scarcely proper to appoint a man responsible manager of an undertaking, and then to tell another man to overlook him, both as to the materials he uses and the buildings in which the work is carried on. It will be within the power of the Surveyor to go into the gas-works at any time, measure the coal, coke, lime, and sulphate of ammonia in stock, and call for the books, in order that he may satisfy himself that the quantities remaining are as should be. He will also have power to thwart the Manager in any proposal he may make as to the plant or buildings. The position is that a man of skill is appointed to look after the gas undertaking and the property belonging to it, and then a man who may be ignorant of all that pertains to gas making is given extensive powers of interference with him in the discharge of his duties.

A return was submitted by the Burgh Chamberlain to the Broughty Ferry Town Council on Monday, which showed the expenditure that has been incurred upon the new retort house and bench. The total is £7911. Of this, the retort-bench cost £1388, the roof £1114, and the conveyor and machinery £729.

Since Mr. J. Baxter was appointed Gas Manager—or perhaps since Mr. Councillor J. Christie removed from Forfar to Glasgow—I have had little to say with regard to the Forfar gas undertaking. It is with pleasure that I find something this week—and something which is satisfactory. Mr. M'Dougall, in submitting the estimates, said they had a surplus on last year's working, but they had not taken it into account in their estimates. They proposed that the price of gas should be reduced from 4s. to 3s. 9d. per 1000 cubic feet. That was not a low rate; but in a place like Forfar, where they had to pay a high price for the carriage of material, and where their expenditure was heavy, he thought they were doing good work in being able to reduce it to this amount. In considering the question of how to increase the demand for gas, he suggested that they should give greater facilities to consumers to enable them to take advantage of stoves and cookers. The Corporation might, to a certain extent, bear the expense of new fittings in houses, where such were necessary. It was customary in some places to make a reduction in the price of gas that was employed for trade purposes. Were they to do this, there was a probability that gas as a motive power would be more generally used than at present. He had no intention of moving in that direction this year; but he hoped to have the question discussed during the year. They estimated that they would require 3600 tons of coal during the current year, from which, at an assumed yield of 9950 cubic feet of gas per ton, they anticipated a total of 35,764,000 cubic feet of gas. They also estimated for 221,200 gallons of tar and liquor, and to sell 1480 tons of coke. The estimated surplus on the year's working was £640. The Council adopted the estimates.

The Greenock Corporation on Tuesday reduced the price of gas to ordinary consumers from 3s. 2d. to 2s. 9d., and to users of gas through prepayment meters from 4s. 2d. to 3s. 4d. per 1000 cubic feet. Ordinary consumers thus benefit to the extent of 5d., and prepayment consumers to the extent of 10d. per 1000 cubic feet; but there is still 7d. difference between the prices paid by the two classes, which might stand further lessening. Mr. Morison, at the Council meeting, stated that if they retained the prices of gas at the present figures, they would have a surplus of £7286 at the end of the current year. The reductions they made would mean £5000 less revenue; but they would still have a balance of £1296, which, he thought, would be sufficient to meet contingencies. The reductions in price date from May last. A year ago, the Corporation reduced the price from 3s. 4d. to 3s. 2d. per 1000 cubic feet to ordinary consumers.

Is Perth to be the first place in Scotland to give up electricity and revert to gas for public lighting? It is announced that Mr. M'Gregor Mitchell and other councillors have been considering the advisability of changing the lighting of the city from electricity to incandescent gas, on the ground that it would be cheaper. Mr. Mitchell has, it is said, drawn up a report in which it is shown that the cost of lighting the city under the present system is £2930, and that a saving of £827 a year would be effected by the use of incandescent gas-lamps. The cost of converting the system of lighting to gas would come to £821, so that, even in the first year, there would be a small saving; but in future years it would be over £800.

In a number of burghs this week the annual financial statement has been submitted to the respective corporations, including the accounts of the gas departments, where they are not administered under special statutes. Bailie Melvin, the Convener of the Finance Committee of the Arbroath Town Council, said they had had a very favourable result in the Gas Department. The revenue from the sale of gas and residual products amounted to £16,144, and the expenditure to £10,651. They had applied the difference of £5493 in paying off a debit balance of £1820 from the accounts of the previous year; and after meeting the charges for annuities, interest on borrowed money, and sinking funds, there remained a balance of £750, which they had carried to the contingency and depreciation account. In addition to this, they had been able, as they knew, to reduce the price of gas from 4s. 4½d. to 3s. 6½d. per 1000 cubic feet—a reduction of 10d. If the Gas Department were as prosperous during the current year as it was last year, the condition financially would be greatly improved.

At the Kilmarnock Town Council, it was reported that the Gas Department last year earned £23,377, and expended £20,972. Compared with the previous year, the revenue was less by £1900, and the expenditure less by £3000. That was accounted for by the period having been only eleven instead of twelve months, and by their having reduced the price of gas. They had a net profit for the year of £2400. During the twelve months, £20,000 was expended upon the new gas-works, which are expected to be completed by the end of the year. The price of gas is to remain at 2s. 11d. per 1000 cubic feet.

At Dunfermline this week, the most notable item of business in connection with the Gas Department was the fixing of the coal contracts for the year. These are worth noting. The coal is drawn from four collieries. There are 5000 tons of Wallsend small coal, 3000 tons of Muirbeath treble nuts, 1000 tons of Lasswade small coal, and 1000 tons of Kinnaird small coal. The total cost of the 10,000 tons is £3487, or an average of 6s. 11·7d. per ton. Out of such material, Mr. A. Waddell is able to make gas which during August was reported to have been of 21·57-candle power. Mr. Waddell enriches by benzol, which

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may account for his results; but, even with benzol, there are many managers who would be altogether helpless if they were supplied with coal such as this. The gas produced, it is evident, is giving satisfaction, for, during August, there was an increase in the consumption of 258,000 cubic feet—equal to 5·99 per cent.

The undertaking of the Airdrie and Coatbridge Water Company having been taken over by the Local Authorities, a scheme for the distribution of £380,000, part of the price received, has been drawn up. The distribution is at the following rates: For each original ordinary £5 share, £17 3s. 3·65d.; for each ordinary £10 share, £17 3s. 3·65d.; for each 6 per cent. preference £10 share, £20 11s. 11·58d.; and for each 5 per cent. preference £10 share, £17 3s. 3·65d.

## COAL TRADE REPORTS.

### Lancashire Coal Trade.

The general condition throughout the coal trade of this district continues one of quietude. At the pit mouth, best Wigan Arley coals remain about 13s. 6d. to 14s. 6d. per ton, seconds Arley and Pemberton four-feet 11s. 6d. to 12s. 6d., and common house-fire coals range from 9s. 6d. to 10s. 6d. The inferior descriptions of round coal continue in not more than indifferent request, for steam, forge, and general manufacturing purposes. The short time that collieries have been working prevents any excessive output coming on the market; but supplies are more than ample for requirements, and prices are with difficulty maintained at late rates—8s. to 8s. 3d. per ton at the pit being average figures for common, and 9s. 6d. to 9s. 9d. for some of the best qualities of steam and forge coal. Supplies of engine fuel continue plentiful. At the pit, common slacks average 4s. to 4s. 3d. and 4s. 6d. per ton, medium sorts 4s. 9d. to 5s. 3d. and 5s. 6d., and the best qualities from 6s. and 6s. 3d. up to 6s. 9d. For shipment, the demand is only moderate, with steam coals, delivered at the ports on the Mersey, not averaging more than 9s. 3d. up to 9s. 9d. per ton. Coke remains strong at full quotations.

### Northern Coal Trade.

There is still a full demand for coal for early delivery, though that for forward sale is not quite so good. In the steam coal trade, there is a little pressure to get supplies to the North sent away before the end of the month; so that the trade is now very active. Best Northumbrian steam coals are 10s. 9d. to 11s. per ton f.o.b., second-class steams vary from 9s. to 9s. 3d., and steam smalls are from 5s. 3d. to 5s. 6d. The production is being well maintained; and at present it is also well taken up. In the gas coal trade, there is now a steady enlargement in the home demand, and the deliveries on the long contracts are heavier; so that the production is better taken up. Generally, Durham gas coal varies in price, for occasional cargoes, from 8s. 6d. to 9s. per ton f.o.b., according to quality. One or two contracts for export have been settled, but not for large quantities, at about the lower figure. Gas coke is irregular in quotation; the export trade being better supplied. Possibly 14s. 6d. per ton f.o.b. may represent the medium quotation for good qualities at present.

### Scotch Coal Trade.

There is still a lack of feature in the coal market. Business is plentiful, but not over-abundant. Prices have not varied. The quotations are: Main 7s. 9d. to 8s. per ton f.o.b. Glasgow, ell 8s. 6d. to 9s. 9d., and splint 9s. 3d. to 9s. 6d. The shipments for the week amounted to 239,414 tons—a decrease of 14,899 tons upon the previous week and of 7028 tons upon the corresponding week of last year. For the year to date, the total shipments have been 7,685,413 tons—an increase of 219,434 tons upon the same period of last year.

**Automatic Water Supply.**—In Dawson City, water for domestic purposes is said to be supplied through machines operated by dropping a coin-shaped slug into a slot, in order to avoid the difficulty arising from the freezing of house service-pipes in that region. Five gallons are delivered at a time. There are few, if any, house service-pipes.

**Langsett Water-Works of the Sheffield Corporation.**—Alderman Gainsford, the Chairman of the Sheffield Water Committee, stated at the last monthly meeting of the Council that there had been rather startling developments with regard to the Langsett works, which were costing much more than had been originally anticipated. The Council had power to spend £1,500,000 on the scheme; and they were also responsible for a fourth part of the Derwent Water Board's outlay, which would be at least £5,000,000 or £6,000,000 more. He therefore deprecated any interference with the water revenue at the present time. These remarks were in connection with a resolution that the Committee should report to the Council as to the advisability, in the interest of the public health, of abolishing or lowering the charges for the supply of water to baths and for other purposes. The motion was carried.

**The Quality of the Gosport Water.**—It is stated that an answer has been received to the application of the Gosport District Council that the Local Government Board should hold an inquiry into the water question. The Council recently resolved that the analyses of the water contained sufficient evidence of an unsatisfactory character (especially with regard to the high percentage of chlorine) to warrant application being made to the Local Government Board to hold an inquiry into the water supply of the district, in order to determine whether the supply was of a sufficiently high standard of purity to safeguard the health of the inhabitants, and, secondly, whether the maximum quantity the Company could supply was sufficient to meet the requirements, particularly in view of the near completion of the system of drainage. To this the Board have replied that they do not consider an inquiry necessary, and will not hold one. It is added that the Board have confidence in the ability of the Company to carry out the powers conferred upon them by their Act.


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**Lighting of Mundesley by Gas.**—During the past nine months, works have been in progress for the supply of Mundesley, near North Walsham, with gas; and on Saturday, the 12th inst., the town was lighted by eighteen 50-candle incandescent lamps on posts 12 feet high. They will be lit each night from sunset till 10.30 p.m., all the year round.

**Eighty Years of Gas Supply at Bradford.**—It is now eighty years since gas was first used in Bradford; but unfortunately there are no records of the consumption for the first year or two. In 1827, however, it amounted to 6,616,000 cubic feet; and this figure was more than doubled during the following ten years. Last year the total consumption was 1,960,482,000 feet. Upwards of £1,000,000 is at present invested in the undertaking.

**Suffocation by Gas.**—The death occurred in Bristol Infirmary last Thursday of a man named Evans, a newsagent, who was found in his bedroom in an unconscious condition—the room being full of gas. Deceased did not open his shop at the usual hour on Wednesday morning; and the neighbours becoming alarmed, entrance was gained to the premises. The gas was turned on, and Evans was found in bed. He was promptly removed, but never recovered consciousness.

**South Australian Gas Company.**—According to the report presented at the annual meeting of this Company on the 26th ult., the sale of gas residual products, &c., in the twelve months ending June 30, produced a sum of £90,177; and after paying the usual dividends, the balance to the credit of the profit and loss account was £22,057. The Directors have decided to supply pipes and burners for cooking and lighting, free of cost, under the slot-meter system, in certain districts in South Adelaide; and already a large number of new customers have been obtained in this way.

**Lucas Lamps at Adelaide, South Australia.**—The lighting of the Adelaide Town Hall has been improved by the fixing of seven large Lucas gas-lamps, each of 700-candle power. As these lamps use only 17 cubic feet of gas each per hour, the cost for gas is less than 8d. per hour for the seven. The lighting and ventilation of the gallery have also been much improved by their installation. Lucas lamps have also been fixed in five of the suburban Town Halls—viz., St. Peter's, Hindmarsh, Unley, Glenelg, and Norwood; as well as in the Institute, North Adelaide, in the Jubilee Exhibition Building, and in the Boys' Institute.

**Aberavon Gas Undertaking.**—The Gas Committee of the Aberavon Town Council spent a long time at their last meeting in considering their annual statement of accounts. The gas and meter rentals showed the gratifying increase of more than £500; while the amount paid for coal was £500 less than in the previous year. All round there was a tendency to reduce the expenditure; and the working balance at the end of the year was £792, compared with the insignificant sum of £41 in 1901-2. The results achieved reflect great credit upon the Manager (Mr. Arthur Bond), who has had to overcome many obstacles on account of the dilapidated condition of the works resulting from past bad management.

**Progress at Driffield.**—The statement of Mr. E. W. Wright, the Manager of the Driffield Gas-Works, for the year to June 30 shows all-round progress. The coal carbonized was 2594 tons, or an increase of 201 tons; and the gas produced reached a total of 26,102,000 cubic feet, or an increase of 1,219,000 feet. The make per ton was 10,062 cubic feet, compared with 10,402 feet; but the gas sold per ton showed an increase of 129 cubic feet, the leakage having been reduced by 3·57 per cent. The quantity of gas sold to private consumers was 21,408,100 cubic feet, compared with 19,422,400 feet in 1502; and 94,000 cubic feet more was used in the public lamps. The revenue for the year was £5218, against £4638 in 1902—an increase of £580.

**An Unsuccessful Artesian Well.**—Some time since the Poplar Guardians sank an artesian well at their workhouse, in order to be independent of the East London Company's supply. The experiment does not seem to have been a success. At the last meeting of the Board, general complaint was made in regard to the water from the well; the Rector of Bow saying it was such that he would not have it in his household. Another guardian said he had tasted the water, and was surprised to find that he had lived through the experiment; while others said it was muddy, and contained greasy matter. It was decided to endorse the recommendation of the House Committee to again take a supply for drinking purposes from the East London Company.

**West Kent Gas Company.**—At the recent half-yearly meeting of this Company, the Chairman (Mr. J. J. F. Stevens), in moving the adoption of the report, which, as mentioned in another column, contained the announcement of the retirement of Mr. George Anderson, explained that this step had been taken solely on account of advancing age, and that the policy he had inaugurated would be continued. Mr. Stevens furnished a detailed statement as to the excellent progress made in the six months ending the 30th of June—the revenue account being one of the best presented, and showing that the concern stood high among the gas companies in the present year. He also mentioned that a 12-inch main was being laid from Erith to the works at Crayford, in order that all the gas might be made at the former place. The statutory dividends were declared.

**Cost of the Otley Water Scheme.**—In proposing that the Otley District Council should borrow a further £10,000 on account of their new water-works, Mr. Duncan, the Chairman of the Committee, stated that, as a foundation had not yet been found for the whole length of the puddle trench, he could not give an exact statement as to the probable cost; but so far as could be approximately estimated, it would not exceed £90,000. The original estimate was for £55,000. The construction of the reservoir was let for £49,500; and the cost of ironwork for it made it up to £50,903. Other items brought the total expenditure at the letting of the contracts to £76,661. Added to this was the Engineer's charge (£4400), making a total of £81,061. The estimated liabilities were £10,000; and inasmuch as there was a sum of £4000 for contingencies, he thought the total would not exceed £90,000. Against this there was a revenue of £400 as the rent of the huts, which had cost £3534, and which, it was thought, would realize about half that sum when sold. The proposal was agreed to.


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**Increased Water Storage for Buxton.**—At the meeting of the Buxton Urban District Council on Friday, a tender was accepted for the construction of a reservoir on Stanley Moor, for the sum of £101,590. This work is part of a scheme for improving the water supply of the town, which will cost altogether £140,000.

**A New Reservoir for Rhondda.**—The Rhondda Urban District Council have resolved to proceed with the construction of a new reservoir at Garreglwyd. It is stated that 18 acres of land will have to be acquired; and the reservoir, with a gathering ground of 120 acres, will have a capacity of 104 million gallons. The estimated cost is £32,000.

**Antwerp Water-Works Company.**—The report of the Directors of the Antwerp Water-Works Company for the half year ending June 30 shows a net profit of £19,536 (compared with £18,110 for the corresponding period of 1902), from which they have declared an interim dividend at the rate of 7 per cent. per annum. To provide an instalment of the funds required for further works, the Board propose to issue £15,000 of 3½ per cent. debentures.

**Water Storage at Frinton-on-Sea.**—Last Thursday, a water-tower recently erected by the Tendring Hundred Water Company at Frinton-on-Sea was formally inaugurated by Colonel R. P. Davis, the High Sheriff of Essex. It was designed by the Company's Consulting Engineer, Mr. W. B. Bryan, M.Inst.C.E., the Chief Engineer of the East London Water Company, and was erected by Messrs. Ransome and Rapier, of London and Ipswich. It is constructed of steel plates, and stands on eight lofty stanchions of steel, resting on blue-brick piers with concrete foundations. It is 27 feet in diameter, and has a capacity of 75,000 gallons.

**New Water-Works for Burley-in-Wharfedale.**—On Saturday, the 12th inst., the water-works which have been constructed on Burley Moor for the supply of Burley-in-Wharfedale were formally opened by Mrs. T. Town, the wife of the Chairman of the Urban District Council. Under parliamentary powers obtained in 1899, certain water rights over a gathering-ground of 300 acres were acquired, and the works necessary for their utilization proceeded with by Mr. Tom Smith, of Bingley, from the plans of Mr. Malcolm M. Paterson, M.Inst.C.E., of Bradford. They include the high and low Lanshaw reservoirs—holding respectively 12 and 2½ million gallons of water—and the Carr Bottom reservoir, which has a capacity of 17½ million gallons; making a total of nearly 32 million gallons. The daily yield will be increased from 50,000 to 231,650 gallons, after making allowance for the necessary compensation water. This will be sufficient to supply a population of 9000 with 26 gallons of water per diem, whereas Burley has only about 4000 inhabitants. The last instalment of the old water-works loan will be paid in November; and it is expected that a reduction in the rates will result from the undertaking just inaugurated.

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The first 60-inch cast-iron pipe was cast at the Scottdale plant of the United States Cast-Iron Pipe Company a few weeks since; this is the largest size ever cast in America. Seven tons of metal are required for each section.

The profits of the German Incandescent Gas-Light Company (who carry on the Welsbach business in that country) for 1902 have enabled the Directors to pay a dividend at the rate of 9 per cent., as compared with 7 per cent. in the previous year.

The Stettiner Chamotte-Fabrik Actien-Gesellschaft and the Berlin Anhaltische Maschinebau Actien-Gesellschaft have been awarded a gold medal at the Dresden Exhibition for a joint contribution of a model of a first-class retort installation.

Fredensborg Palace, one of the country residences of the King of Denmark (which is the meeting place of the various members of the Royal Family, including the Queen of England), is illuminated by Kitson lamps, installed by the Kitson Lighting Company of Scandinavia.

The cost to the Sutton Urban District Council, the Croydon Rural District Council, and the Carshalton Urban District Council of opposing the Bill promoted by the Sutton District Water Company amounted to £715 2s. 6d., which has been divided among the three districts as follows: Sutton, £376 7s. 6d.; Croydon, £230 6s. 6d.; Carshalton, £108 8s. 6d.

It is stated by a German paper that, as from Jan. 1 next, the price of electric light in Berlin will be reduced 27 per cent.—*i.e.*, from 55 to 40 pfennigs (about 6½d. to 5¾d. English money) per kilowatt-hour, and that the price for electric light will then be cheaper than in any other large city. This reduction is being made with a view to competing more closely with gas.

The Manchester and Sheffield Tar-Works Company, Limited, has been registered with a capital of £5000 in £10 shares, to take over the business of tar distillers and manufacturing chemists carried on by Messrs. Ellison and Mitchell, Limited, and Mr. G. W. Mitchell, as the Manchester and Sheffield Tar-Works Company, at Attercliffe, near Sheffield, and at the Globe Chemical-Works, Clayton, near Manchester, and to acquire the works.

At the meeting of the Lambeth Borough Council on Thursday, the Lighting Committee reported that they had given directions that the "Kingston" lanterns at present in the main roads which are to be lit by No. 4 burners shall be put in the side streets when the conversion takes place, so that the main roads shall have "Windsor" lanterns throughout. Estimates were passed on the basis that the lighting charges for the year ending March 31, 1904, will be £14,085.

At the Coroner's inquiry into the circumstances attending the death of a man at His Majesty's Theatre on the evening of the 12th inst., as recorded last week, a letter was produced in which the deceased (Joseph Arthur Kirkham) expressed his intention of committing suicide; and evidence was given to show that there was nothing in the appearance of the room in which the body was found to justify the conclusion that he had not done so. Dr. G. A. Hamerton deposed that death was due to poisoning by coal gas; and the Jury returned a verdict of "Suicide during temporary insanity."


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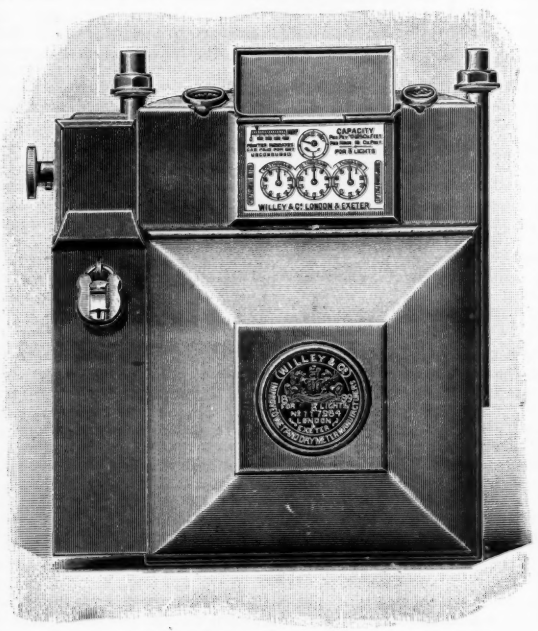


ALL PARTS INTERCHANGEABLE.

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**Tens of Thousands in use, and adopted exclusively by many Gas Companies.**

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**WILLEY & CO., LONDON AND EXETER.**

## WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

**Situations Vacant.**

RESIDENT ENGINEER. Rhondda Gas and Water Department. Sept. 29.
CLERK. Redcar Gas-Works.
ASSISTANT TO SUPERINTENDENT. Mid-Kent Gas Company.
FITTER AND SMITH. No. 4072.
GAS-FITTERS. H. Greene and Sons, London.
STOKER. Sunbury Gas-Works.
STOKERS. Godalming Gas-Works.

**Situations Wanted.**

GAS-STOVE TRADE. No. 4091.
LECTURES ON GAS COOKING, &c. Madame Alting-Mees, London.
MANAGER. No. 4089.
SECRETARY AND MANAGER SMALL WORKS. No. 4096.
WORKING MANAGER OR ASSISTANT. Poole, Madeley.

**Agent Wanted by French Company.** No. 4094.

**Classes in Gas Manufacture, &c,** Battersea Polytechnic.

**Plant for Sale.**

SMALL PRIVATE GAS-WORKS PLANT. Estate Office, Aylesford.

**Plant Wanted.**

GASHOLDER TANK. No. 4085.
GASHOLDER AND TANK. No. 4098.

**Loan on Mortgage.** No. 4099.

**Sale of Shares.**

BOURNEMOUTH GAS AND WATER COMPANY. Oct. 8.

**Meetings of Companies.**

BRITISH GASLIGHT COMPANY. London Office, Sept. 30. Twelve o'clock.

**TENDERS FOR**

**Coal**

BELFAST GAS DEPARTMENT. Tenders by Oct. 8.

**Covered Service Reservoirs.**

BRADFORD CORPORATION. Tenders by Oct. 1.

**Fire-Clay Goods.**

ROCHESTER, CHATHAM, AND STROOD GASLIGHT COMPANY. Tenders by Sept. 28.

**Light Railways and Tramways.**

BRADFORD CORPORATION. Tenders by Oct. 1.

**Masonry Dam, Bye-Pass Channels, Cast-Iron Cylinders, &c.**

BRADFORD CORPORATION. Tenders by Oct. 1.

**Office, Store, Shed, &c.**

BRADFORD CORPORATION. Tenders by Oct. 1.

**Retorts, &c.**

ROCHESTER, CHATHAM, AND STROOD GASLIGHT COMPANY. Tenders by Sept. 28.

**Tar and Ammoniacal Liquor.**

BLACKPOOL GAS DEPARTMENT. Tenders by Sept. 26.
CHIGWELL, LOUGHTON, AND WOODFORD GAS COMPANY. Tenders by Sept. 22.
GAINSBOROUGH GAS DEPARTMENT. Tenders by Sept. 26.
LLANDUDNO GAS DEPARTMENT. Tenders by Oct. 10.
NEWTON-IN-MAKERFIELD GAS DEPARTMENT. Tenders by Oct. 3.

## NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

*No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.*

**COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.**

**Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.**

**Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.**

**TERMS OF SUBSCRIPTION to the "JOURNAL."**

**United Kingdom: One Year, 21s.; Half-Year, 10s. 6d.; Quarter, 6s. 6d.**
Payable in Advance. If credit is taken, the charge is 25s. a year.

**Abroad (in the Postal Union): £1 5s. 6d., payable in Advance.**

All Communications, Remittances, &c., to be addressed to
WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.


**OXIDE OF IRON.**

**O'NEILL'S OXIDE has a larger annual** sale than all other Oxides combined.

SPENT OXIDE purchased in any district.

GAS PURIFICATION & CHEMICAL CO., LD.
JOHN WM. O'NEILL, Managing Director,
PALMERSTON HOUSE, LONDON, E.C.

WINKELMANN'S
**"VOLCANIC" FIRE CEMENT.**
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

**BROTHERTON & CO., LIMITED.**
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

SPECIAL PAINT FOR GAS-WORKS.
**JOHN E. WILLIAMS AND CO.,**
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.

**AMMONIACAL LIQUOR wanted.**
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

**JOHN RILEY & SONS, Chemical Manu**facturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

HYDRATED OXIDE OF IRON.
**PREPARED from Pure Iron.**
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

**GAS TAR wanted.**
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PENNY-IN-THE-SLOT WORK.
**H. GREENE & SONS, Ltd., are pre**pared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.
SURREY ENGINEERING WORKS, BLACKFRIARS ROAD, LONDON, S.E.
Telephone: 1693 HOP. Telegrams: "LUMINOSITY."

**J. & J. BRADDOCK (Branch of Meters** Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

**DUTCH OXIDE OF IRON.**

**THE First Dutch Bog Ore Co., Ltd.** (Eerste Hollandsche Yzererts Maaty), ROTTERDAM.
*General Manager (for England and Wales)*—
CHARLES E. FRY, LEAMINGTON; and at Tower Chambers, Brown Street, MANCHESTER.
*London Managers*—
E. PADFIELD & CO., 96-98, Leadenhall Street, LONDON, E.C.
*General Manager (for Scotland)*—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

**SULPHURIC ACID.**

**SPECIALLY prepared for the Manu**facture of SULPHATE OF AMMONIA.
SPENCER, CHAPMAN, AND MESSEL, LIMITED, 36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341 AVENUE.

**SULPHATE OF AMMONIA**
SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.
For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."
Largest Practice and most Up-to-Date Works in Britain.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

**SULPHURIC ACID for Sale.**
BROTHERTON AND CO., LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

**MADAME ALTING-MEES,** Conférencière Diplomée, désire renouer ses relations avec les Compagnies Gazières, et leur offre ses Services pour des Séries de CONFÉRENCES sur l'Application du GAZ aux USAGES DOMESTIQUES.
S'adresser soit au bureau du "JOURNAL" ou à Madame ALTING-MEES, 102, Sinclair Road, Kensington, LONDRES, W.

**COAL GAS TAR wanted.**
Gas Managers in Gloucester, Somerset, Worcester, Devon, Wilts, Hereford, Monmouth, and Glamorgan PLEASE NOTE. BEST PRICE offered, either on Fixed or Sliding-Scale Basis.
State Quantity to offer for Prompt and Forward Delivery.
The SHARPNESS CHEMICAL COMPANY, Tar Distillers, Sharpness Docks, GLOS.

**OXIDE OF IRON.**
(NATURAL.)

**BALE & CHURCH will be pleased to** send Samples and Quotations, and make Offers for SPENT OXIDE.
BALE'S FIRE CEMENT, PAINT, AND GAS COAL.
5, CROOKED LANE, LONDON, E.C.

**PATENTS AND TRADE MARKS**
PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 248 Holborn.

**ADVERTISER seeks an Appointment** at a Gas-Works in Liverpool or Neighbourhood. Present situation, Secretary and Manager of a small Works—8 millions.
Address No. 4096, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**ADVERTISER seeks re-engagement as** MANAGER of medium sized Gas-Works—from 10 Millions upwards. Thoroughly practical in all departments of Gas-Works, as well as Outside Fitting, Mains, and Stoves. Age 36. Good Testimonials and References.
Address No. 4089, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS-STOVE TRADE.
**ADVERTISER (Age 36), 20 Years' first-**class Experience in the Trade—Commercial and Manufacturing—is open to an ENGAGEMENT. Smart, energetic, good organizer, and thoroughly understands control of business.
Address No. 4091, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**STOKERS Wanted, used to Shovel** Charging. Permanent employment for steady, reliable Men. Wages 31s. per week.
Apply to BENJAMIN BARK, Gas-Works, GODALMING.

**WANTED by a Young Man, a Situation** as WORKING MANAGER in a Small Works, or as an ASSISTANT. Has had Ten Years' Experience in the routine of Gas-Works. Can lay Mains, Fix Meters, and do all Repairs. Age 24. Abstainer. Good References.
Address GEORGE POOLE, Gas-Works, Madeley, SALOP.

**WANTED, a Good Stoker. Shovel** Charging, Regenerator Settings. Wages 30s. per week.
Apply, with Reference, to the MANAGER, Gas-Works, SUNBURY.

**CLERK wanted, next to the Chief Clerk** in the General Office, to keep Gas-Rentals, Ledgers, &c. Wages 30s. per week.
Apply, with Testimonials, to M. FLIGG, Secretary, Gas-Works, REDCAR.

**GAS-FITTERS wanted. Well up in** Barrel Work. First-Class Men only. Continuous employment.
Apply to H. GREENE & SONS, LIMITED, Surrey Engineering Works, Blackfriars Road, LONDON.

**WANTED, a smart Young Man to** ASSIST Superintendent. Must have Practical knowledge of Gas-Fitting, and be a capable Canvasser. Cyclist.
Send Particulars, Wages required, &c., to MID-KENT GAS COMPANY, Snodland, KENT.

**FITTER and Smith Wanted, used to the** Routine of a Gas-Works. A qualified Mechanic preferred.
Apply, by letter, stating all Particulars as to previous and present Employments, Age, and Wages required, to No. 4072, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**A HIGH-CLASS French Company,** whose Head Offices are in PARIS and who have been engaged for more than 30 Years in the Manufacture of Patented Apparatus of the greatest importance for all Water-Works, desires to find in England an ENGLISH AGENT (who would be paid by Salary and by a Share in the profits) possessing the necessary technical and commercial qualification to introduce and sell their Appliances to Water-Works in the United Kingdom.
Applications, by letter, accompanied by Testimonials and Applicant's Photograph, with the fullest Particulars as to his past Experience and learning (degrees obtained), and previous Occupation—should be addressed to No. 4094, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

## RHONDDA URBAN DISTRICT COUNCIL.

(GAS AND WATER DEPARTMENT.)

RESIDENT ENGINEER.

**THE Council contemplate constructing** a RESERVOIR capable of holding 100 million Gallons of Water, near Blaenrhondda, in the Rhondda Valley, Glam., and invite APPLICATIONS for the position of ENGINEER of the proposed Works.
Each applicant for the position must have had experience in the construction of Reservoirs, and must be competent to fulfil the duties:—
(*a*) Of designing the proposed Reservoir, preparing the necessary Plans, Specifications, and Quantities relating thereto, and Advising the Council thereon;
(*b*) Of superintending, on the Council's behalf, the construction of the Works during the execution of the same by the Contractors, devoting the whole of his time to the performance of these duties, and residing in the vicinity of the Works for the purpose.
Only such applicants as can undertake the duties without delay need apply.
Applications, stating previous Experience, Age, Salary required, and when at liberty, accompanied by *copies* of recent Testimonials, must be sent to the undersigned, addressed to the Chairman of the Gas and Water Committee, and endorsed "Engineer," on or before the 29th day of September, 1903.
W. P. NICHOLAS,
Clerk of the Council.
Council Offices, Pentre, Rhondda,
Sept. 15, 1903.

**WANTED, for the purpose of extending** Business, £800 at 4 per cent. per annum. First Mortgage on Gas-Works, Freehold, for a term of Years. No money lenders.
Address No. 4099, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**WANTED, a second-hand Gasholder** and STEEL TANK, between 40 feet and 50 feet diameter.
Particulars to No. 4098, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**TAR Contracts Wanted on the Sliding-Scale or at Fixed Prices.**
Managers and Secretaries desirous of selling to best advantage please communicate with DENT AND CO., Ouse Chemical Works, SELBY.

**FOR SALE—20-inch Valves, Tees,** BENDS, CROSSES, &c., Second-Hand, Cheap. In Good Condition. Makers, Newton Chambers.
Apply to DUXBURY & Co., MANCHESTER.

**FOR SALE—A Private Gas-Works** Plant, in splendid condition. May be Inspected by Appointment.
Apply, by letter, to A. G. WEIGALL, Esq., Estate Office, Preston Hall, AYLESFORD.

## BRADFORD CORPORATION.

NIDD VALLEY WATER-WORKS.
ANGRAM STORAGE RESERVOIR.

CONTRACT No. 9.

**THE Corporation of Bradford are pre-** pared to receive TENDERS for the construction of a MASONRY DAM (1200 ft. in length by 130 ft. in height above the level of the bed of the River Nidd) at Angram, including Wing Walls, River Walls, Gauge Basin, Waste Channels, Valve Tower, Flood Arches, Roads, &c.
Also Two Miles or thereabouts of BYE-PASS CHANNELS, 9 ft. wide, semi-circular in form, constructed with Concrete and Masonry.
And CAST-IRON CYLINDERS, UPSTAND PIPES, OUTLET VALVES, HEADSTOCKS, FLOATS, GAUGES, WEIRS, and other Works, Apparatus, and Appliances.
Drawings may be seen, and printed copies of Specification and General Conditions, Schedule of Quantities, Form of Tender, with Lithographed copies (reduced) of the more important Drawings, may be obtained at the Office of Mr. James Watson, M.Inst.C.E., Water-Works Engineer, Town Hall, Bradford, on and after Tuesday, the 1st day of September, on payment of the sum of £5, which sum will only be returned on receipt of a *bonâ-fide* Tender and the return of all the documents.
Sealed Tenders, on the form supplied, together with the Conditions of Contract, Specifications, and Schedule of Quantities, &c., must be sent in intact, fully filled up, to the undersigned not later than Ten a.m. on Thursday, the 1st day of October, 1903, endorsed "Angram Reservoir Tender."
An Engineer will meet intending Contractors at Pateley Bridge Station at Ten a.m. on Tuesday, the 8th, Friday the 11th, Wednesday the 16th, and Thursday the 24th of September, and show them over the site of the Works.
The Corporation do not bind themselves to accept the lowest or any Tender.
FREDERICK STEVENS,
Town Clerk.
Town Hall, Bradford,
Aug. 26, 1903.

## BRADFORD CORPORATION.

NIDD VALLEY WATER-WORKS.
LIGHT RAILWAYS.

CONTRACTS NOS. 10 AND 11.

**THE Bradford Corporation are pre-** pared to receive TENDERS for the Construction of Thirteen Miles, or thereabouts, of LIGHT RAILWAYS and TRAMWAYS in connection with their intended Angram Storage Reservoir Works.
Plans may be seen, and printed copies of the Specifications, Conditions of Contract, Form of Tender, Schedule of Quantities, &c., may be obtained at the Office of Mr. James Watson, M.Inst.C.E., Water-Works Engineer, Town Hall, Bradford, on and after Tuesday, the 1st day of September, upon payment of £5, which sum will only be returned upon the receipt of a *bonâ-fide* Tender and the return of all the documents.
Sealed Tenders, on the form supplied, together with the Conditions of Contract, Specifications, and Schedule of Quantities, &c., must be sent in intact, fully filled up, to the undersigned not later than Ten a.m. on Thursday, the 1st day of October, 1903, endorsed "Light Railways Tender."
The Corporation do not bind themselves to accept the lowest or any Tender.
FREDERICK STEVENS,
Town Clerk.
Town Hall, Bradford,
Aug. 26, 1903.

## BRADFORD CORPORATION.

WATER-WORKS.

COVERED SERVICE RESERVOIRS.

**THE Corporation of Bradford are pre-** pared to receive TENDERS for the Construction of the under-noted SERVICE RESERVOIRS, including Excavations, Embankments, Masonry, Concrete, Brick, Timber, Ironwork, Valve Chambers, Valves, Pipes, Pipe Tracks, Laying and Jointing Pipes, Roads, Gates, Boundary Walls, &c., &c., viz.:—

No. 1 RESERVOIR,

to be erected in the Parish of Clifton, on the north side of Birkby Lane, Hartshead Moor.

No. 2 RESERVOIR,

to be erected in the Parish of Pudsey, on the north side of Owl Cotes Road.

No. 3 RESERVOIR,

to be erected in the Parish of Calverley-with-Farsley, in a field near Holly Park Mills.
The Three Reservoirs are similar in size and construction, and are each 167 ft. by 60 ft. by 12 ft. deep.
Drawings may be seen, and printed copies of Specification and General Conditions, Schedule of Quantities, Form of Tender, with Lithographed copies (reduced) of the more important Drawings, may be obtained at the Office of Mr. James Watson, M.Inst.C.E., Water-Works Engineer, Town Hall, Bradford, on and after Tuesday, the 1st day of September, on payment of the sum of £5, which sum will only be returned on receipt of a *bonâ-fide* Tender and the return of all the documents.
Sealed Tenders, on the Form supplied, together with the Conditions of Contract, Specifications, and Schedule of Quantities, &c., must be sent in intact, fully filled up, to the undersigned not later than Ten a.m. on Thursday, the 1st day of October, 1903, endorsed "Service Reservoir Tender."
The Corporation do not bind themselves to accept the lowest or any Tender.
FREDERICK STEVENS,
Town Clerk.
Town Hall, Bradford,
Aug. 26, 1903.

## BRADFORD CORPORATION.

NIDD VALLEY WATER-WORKS.

**THE Corporation of Bradford are pre-** pared to receive TENDERS for the Construction of OFFICE, STORE, SHED, &c., to be erected at Gouthwaite Lodge, near Pateley Bridge.
Plan, Specification, &c., may be seen at the Office of Mr. James Watson, M.Inst.C.E., Town Hall, Bradford, on and after Tuesday, the 1st day of September.
Sealed Tenders must be sent to the undersigned not later than Ten a.m. on Thursday, the 1st day of October 1903.
The Corporation do not bind themselves to accept the lowest or any Tender.
FREDERICK STEVENS,
Town Clerk.
Town Hall, Bradford,
Aug. 26, 1903.

**TO BE SOLD—Gas Valves (Six Screw)** by Walker, 16 in. diameter; also Six RACK and PINION, by Donkin, same size. Equal to new.
GASHOLDER, 22 feet by 10 feet, with Steel Tank. Self contained.
Write J. WRIGHT, 181, Queen Victoria Street, LONDON, E.C.

**GAS PLANT for Sale—I can always offer** NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

**THE Gas Committee of the Corporation** of Blackpool are prepared to receive TENDERS for the surplus TAR produced during the next Twelve Months from Sept. 30, 1903.
Tenders to be endorsed and sent to the Chairman by the 26th inst.
By order,
JOHN CHEW,
Gas Engineer.
Gas Office, Princess Street,
Blackpool, Sept. 9, 1903.

## ROCHESTER, CHATHAM, AND STROOD GASLIGHT COMPANY.

RETORTS, &c.

**THE Directors invite Tenders for the** supply of FIRE-CLAY RETORTS, FIRE-BRICKS, and CLAY.
Specifications and Form of Tender may be obtained from the undersigned, to whom Tenders, endorsed "Retorts, &c." must be delivered on or before noon of Monday, Sept. 28, 1903.
J. M. VEEVERS,
Engineer and General Manager.
Gas Offices, Rochester,
Sept. 17, 1903.

## CITY OF BELFAST.

CONTRACT FOR COALS.

**THE Gas and Electric Committee of the** Belfast Corporation invite TENDERS for a supply of 105,000 Tons of best screened GAS COAL, to be delivered free and trimmed in Barges at Belfast Harbour, between the 1st of November, 1903, and the 31st of October, 1904.
No Tender for less than 10,000 Tons will be considered.
Monthly Quantities and Particulars may be obtained from the Manager of the Gas-Works.
Tenders, on Office Forms, endorsed "Tender for Coal," must be delivered at my Office not later than the 8th of October, 1903.
The lowest or any Tender not necessarily accepted.
SAMUEL BLACK,
Town Clerk,

## CHIGWELL, LOUGHTON, AND WOODFORD GAS COMPANY.

TO TAR DISTILLERS.

**THE Directors of the above Company** are prepared to receive TENDERS for surplus TAR, delivered at their Works into Purchaser's Tank-Waggons or Casks during Twelve Months from Oct. 1 next.
Estimated quantity 75,000 Gallons.
Tenders, endorsed "Tar," to be addressed to the Secretary, at the Company's Office, Snakes Lane, Woodford Green, on or before the 22nd inst.
The Directors do not bind themselves to accept the highest or any Tender.
F. SMALLBONE,
Engineer.
Sept. 14, 1903.

## GAINSBOROUGH URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

TENDERS FOR TAR.

**THE Gas Committee of the above** Council are prepared to receive TENDERS for the purchase of the surplus TAR produced at their Gas-Works for a period of Twelve Months from Oct. 1, 1903.
Probable quantity, 450 Tons.
Further Particulars may be obtained on application to the undersigned.
Sealed and endorsed Tenders, addressed to the Chairman of the Gas Committee, must be delivered at the Gas-Works not later than Sept. 26, 1903.
The Committee do not bind themselves to accept the highest or any Tender.
JOHN BALDWIN,
Manager.
Gas-Works, Gainsborough,
Sept. 9, 1903.

THE Llandudno Urban District Council invite TENDERS for the purchase of surplus AMMONIACAL LIQUOR and TAR to be made during a period of Twelve Months next ensuing.

Tenders to be sent in to the undersigned on or before the 10th day of October next, endorsed "Liquor and Tar."

(Signed) ALFRED CONOLLY,
Clerk to the Council.

Town Hall, Llandudno,
Sept. 10, 1903.

NEWTON-IN-MAKERFIELD URBAN DISTRICT COUNCIL.

TO TAR DISTILLERS AND OTHERS.

THE Gas Committee of the above Council invite TENDERS for the surplus TAR which may be produced at their Gas-Works for a period of One Year up to the 30th of September, 1904 (approximate quantity about 500 Tons), delivered in the Contractor's own tanks, free on rail, at Earlestown Station (L. & N.W. Railway).

Form of Tender may be obtained from the undersigned.

Tenders, endorsed "Tar," addressed to the Chairman of the Gas Committee, Town Hall, Earlestown, Newton-le-Willows, to be delivered at my Office not later than the 3rd of October next.

The Committee do not bind themselves to accept the highest or any Tender.

C. COLE,
Clerk to the Council.

Town Hall, Earlestown,
Sept. 19, 1903.

BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at this Office on Wednesday, the 30th inst., at Twelve o'clock precisely, to transact the usual Business, and to declare a Dividend for the Half Year ended the 30th of June last.

Notice is Hereby also Given, that the TRANSFER BOOKS of the Company WILL BE CLOSED on the 19th and RE-OPENED on the 1st of October.

By order of the Court of Directors,
H. B. CHAMBERLAIN,
Secretary.

Chief Office: No. 11, George Yard,
Lombard Street, London, E.C.,
Sept. 9, 1903.

BOURNEMOUTH GAS AND WATER COMPANY.

ISSUE OF £10 SEVEN PER CENT. "B" SHARES.
MINIMUM PRICE OF ISSUE, £15 PER SHARE.

SALE by TENDER of 1000 £10 SEVEN PER CENT. "B" SHARES, in pursuance of the provisions of the Bournemouth Gas and Water Act, 1896.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL by TENDER 1000 "B" SHARES, of £10 each (the Dividend on which is limited to £7 Per Cent.), to be paid up in full on or before the 31st of December, 1903.

Particulars and Conditions of Tender may be obtained at the Company's Offices, Bournemouth, or of the Secretary, as under.

Sealed Tenders must be sent to the Secretary not later than Eleven o'clock on Thursday morning, the 8th of October, 1903.

By order,
WILLIAM CASH,
Secretary.

London: 90, Cannon Street, E.C.
Sept. 16, 1903.

Fifth Sale, Water Order, 1902.

BOROUGH OF PORTSMOUTH WATER-WORKS COMPANY.

IMPORTANT SALE OF NEW ISSUE OF SHARES
IN THIS OLD-ESTABLISHED AND GOOD DIVIDEND-PAYING COMPANY.

LOVE & COOPER are favoured with Instructions from the Directors of the above Company to SELL BY PUBLIC AUCTION, at the Lower Albert Hall, Commercial Road, Portsmouth, on Wednesday, Sept. 30, 1903, at Seven o'clock in the Evening (in convenient Lots), the fifth portion of the New Issue authorized under the Borough of Portsmouth Water Order, 1902, consisting of

2000 SHARES OF £5 EACH

(fully paid), forming part of the New Ordinary Capital authorized under such Order.

The Auctioneers desire to call the special attention of Capitalists, Investors, and others to this very favourable opportunity of securing Shares in such a thoroughly sound Local Company.

The Shares will be sold *free of any charges*, Fees, or Expenses whatever to the Purchaser.

Full Particulars and Conditions of Sale may be obtained, with any further Information, from the Secretary of the Company, J. L. WILKINSON, Esq., F.C.I.S., at the Company's Offices, Commercial Road, PORTSMOUTH; or of the AUCTIONEERS, at their Offices, 14, Osborne Road, SOUTHSEA.

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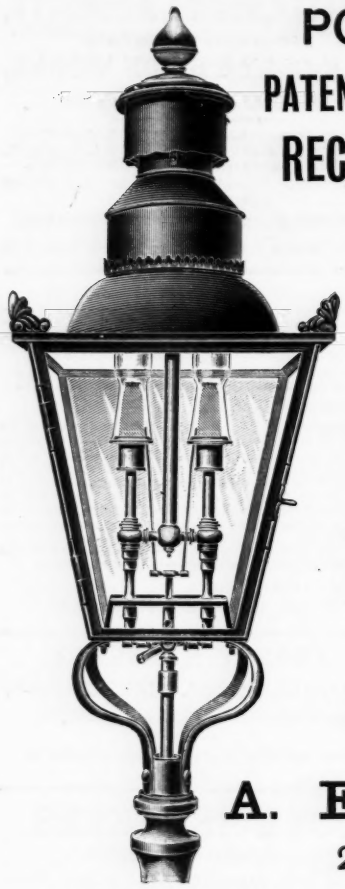

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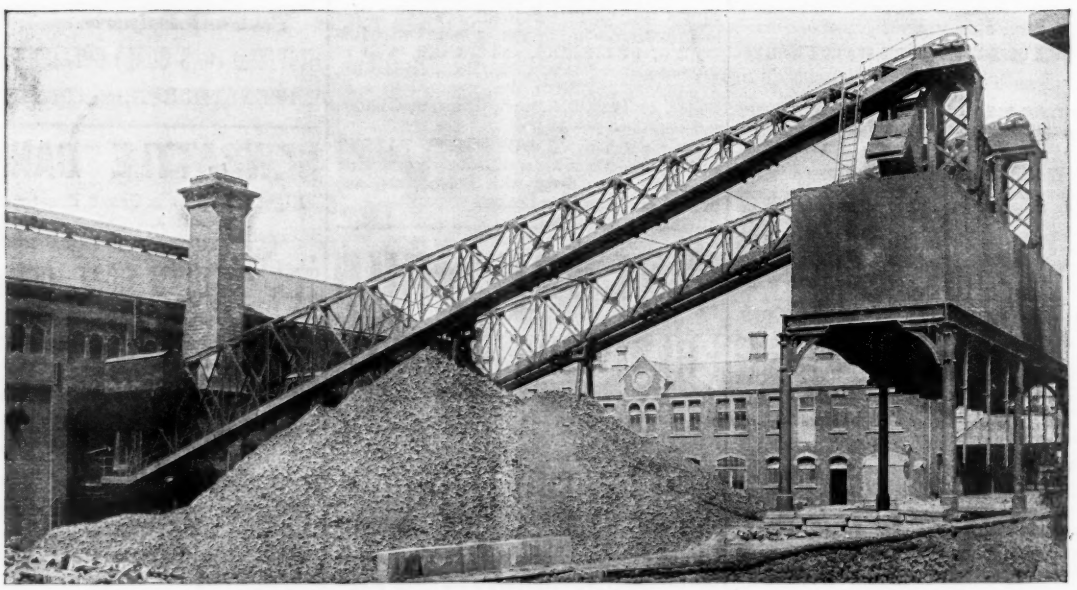

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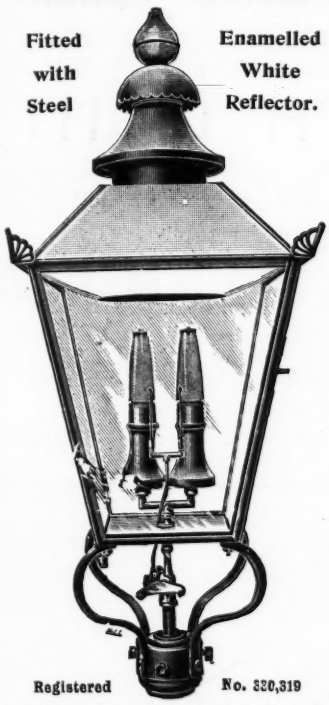

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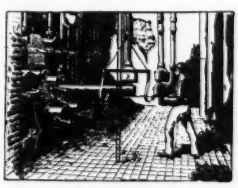

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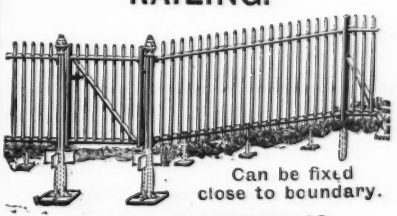

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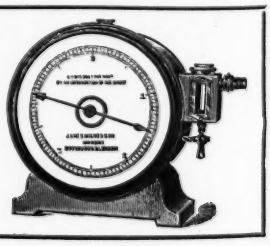

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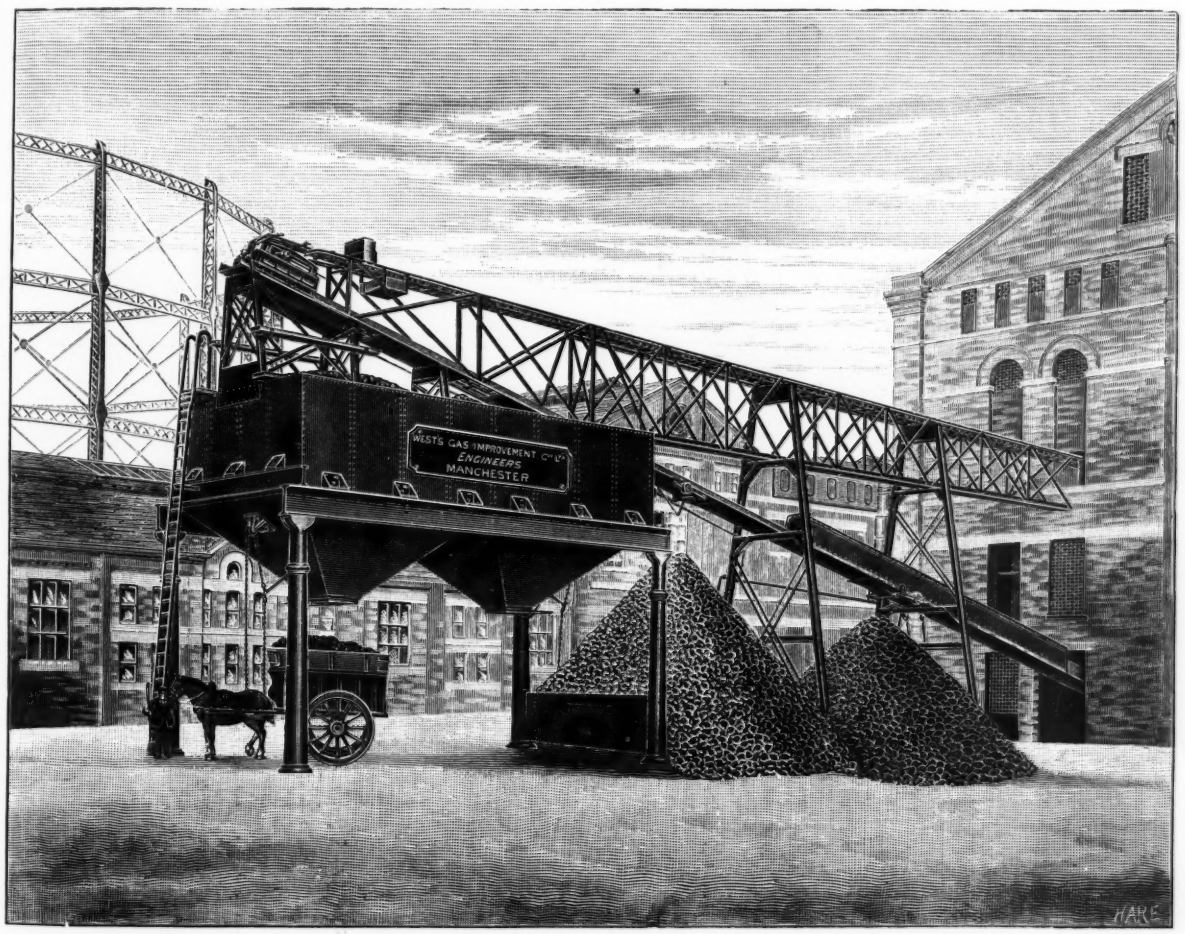


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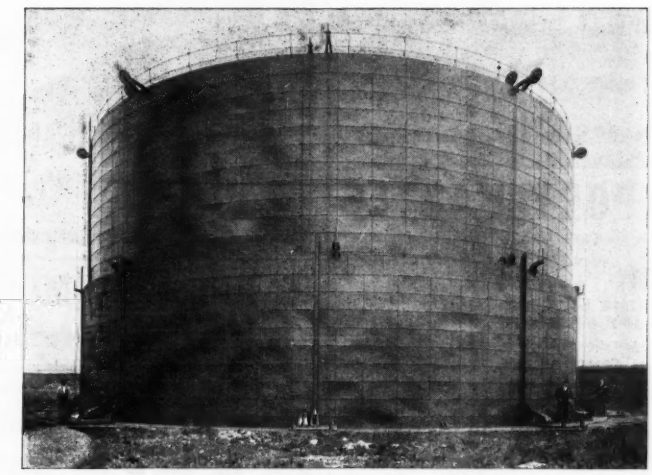

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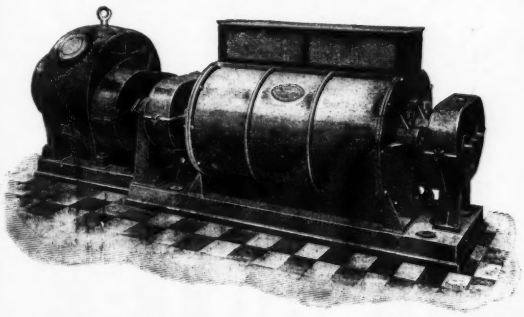

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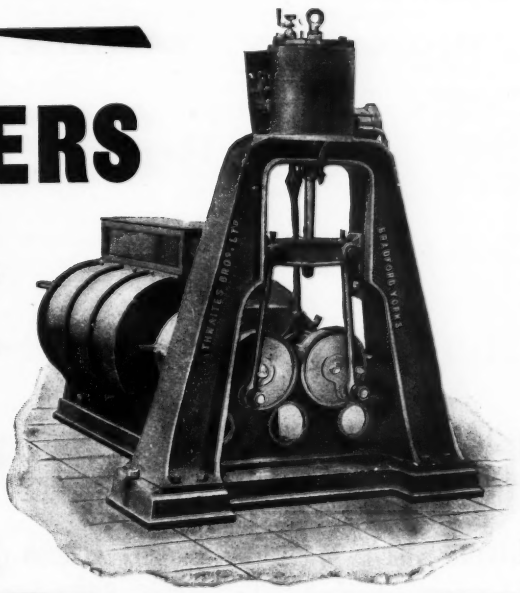

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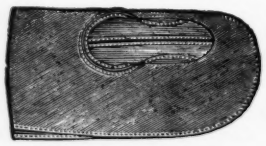

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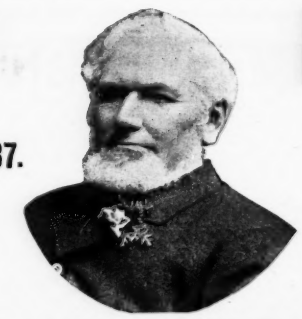
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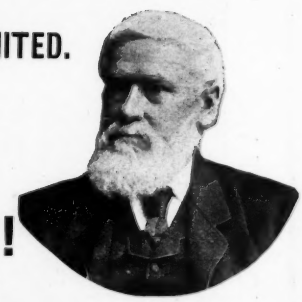
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